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Essays on Trade and Foreign Direct Investment Costs and Migration

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Abstract

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This dissertation consists of three essays on trade and investment costs and migration. The first paper documents how timeliness induces U.S. parent firms to adjust their trade activities with affiliates located abroad, and the extent to which these adjustments change according to the time sensitivity of the industry in which the multinational enterprise (MNE) operates. The results show that parent firms operating in manufacturing are sensitive to shipping time. Long shipping lags reduce parent firms' import from (export to) affiliates. At the sectoral level, there exists some heterogeneity in MNE's response to time. When MNEs are ranked on a spectrum of time sensitivity, those operating in computers and machinery are shown to be more time sensitive, with coefficients consistently surpassing that of other industries. Those operating in chemicals and metals appear to be less time sensitive. The results suggest that, countries that focus on reducing bottlenecks and building infrastructure that promote efficient and fast movement of goods across borders are not only promoting trade but more subtly, improving their participation in the global production networks in manufacturing.

The second paper presents empirical evidence on the effects of variable and fixed costs of export on the extensive and intensive margins of trade for South vs. North exporters. In particular, we search for the presence of any systematic development related bias, where South exporters face higher market access friction relative to North exporters. At the extensive margin, where we compare the effects of fixed and variable costs on the probability of success in entering export markets, we do not find any significant development related bias. Similarly, at the intensive margin, where we examine the effect of observable variable cost on the export volume of successfully entrants into export markets, we do not find any significant North-South bias.

The last essay examines how foreign-born migrants from developing countries (South) attract foreign direct investment (FDI) from developed countries (North) to their countries' of origin. South migrants have information advantage over North investors concerning the nature of the investment climate in their home countries. Transfer of this knowledge can lower start-up barriers and help match North investors with investment opportunities in the South. Using bilateral migration and FDI data for 18 OECD and 101 developing countries, the empirical evidence suggests that, high stock of South migrants in North is associated with higher FDI flow from North to South. However, the hypothesis that the positive effects of South-North migration on North-South FDI may be stronger when the start-up costs of investment is higher is the South is not strongly supported by the data.

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Chapter 1

Time Cost and Multinational Firms' Trade in Manufacturing

1.1 Introduction

Timeliness matters for international production and manufacturing networks. Multinational firms are increasingly adopting production and distribution techniques (e.g, lean retailing, just-in-time manufacturing etc.) in which efficient and timely delivery of intermediate and final goods are of the utmost importance. Millions of electronic parts and components cross borders each day, moving to assembly plants scattered around the globe for further processing. As noted by Yi (2003), steel from Japan is exported to Mexico, where it is stamped, pressed, and shipped to the United States to be converted to farm equipment, some of which is re-exported back to Japan. Similarly, fashion clothing and electronic gadgets manufactured in very distant places are delivered to final consumers within a short period after an order is placed. Zara, a vertically integrated designer clothing company, manufactures its products primarily in Spain and Portugal, but twice a week, Zara's clothing arrives at affiliate retail stores located in over 80 countries around the world.[1] This cross border trade between parent

[1]A more detailed article on Zara's timely retail approach appeared in the *The Economist* ("Floating on Air," May 17, 2001).

firms and their affiliates may imply that manufacturing MNEs engaged in international production are in need of speed, and the ability to move goods across borders on time should be an important consideration in parent firms' integration strategies with foreign affiliates.[2]

However, previous empirical analyses on MNEs integration decisions have mainly focused on the *monetary costs* of parent-affiliate trade. Among the broad themes that have attracted attention in the literature are tariffs, (Feinberg and Keane, 2001; Yi, 2003), corporate taxes and transfer pricing, (Hanson et al., 2005; Wei, 2000; Grubert and Mutti, 1991), wages and skill intensity (Carr et al., 2003; Budd et al., 2005; Yeaple, 2003b) and transportation cost. Little emphasis in the literature has been placed on how *time costs* affect how parent firms choose their affiliates across countries, but there exists anecdotal evidence in popular press and business reports emphasizing the importance of timeliness to MNEs dealing in manufactured goods.[3] TPG, a transport group, contracts with Ford to move parts and components to its assembly plant in Toronto, Canada. To keep the assembly plant running like a clockwork, TPG organizes around 800 deliveries a day from 300 different affiliates. Parts are loaded into delivery trucks in a pre-arranged sequence to speed up the unloading process when they arrive at the assembly plant. Loads arrive at 12 different points along the assembly line without ever being more than 10 minutes late.[4] While such anecdotal evidence is commonplace, empirical evidence on the importance of timeliness for parent-affiliate trade is lacking.

Using sectoral level data on United States multinational firms operating in the man-

[2]According to *The New York Times* ("How the U.S. Lost Out on iPhone Work, "January 21, 2012), "an estimated 90 percent of iPhone parts are manufactured abroad. Advance semiconductors from Germany and Taiwan, memory chips from Korea and Japan, display panels and circuitry from Korea and Taiwan, chipsets from Europe and rare metals from Africa and Asia. And all of it put together in China."

[3]According to the *"New York Times"* article above ... for technology companies, the cost of labor is minimal compared with the expense of buying parts and managing supply chains that bring together components and services from hundreds of companies.

[4]*The Economist* ("A Moving Story," December 5, 2002). Exel, a shipping liner and a road hauler has a deal with Maxtor, a maker of computer disk-drives, that requires it to ship computer drives from factories in Asia to companies such as Dell and HP in Asia and America, all within 48 hours.

ufacturing industry, this paper documents how timeliness in shipping across countries induces United States' parent multinational firms to adjust their trade activities with affiliates located abroad, and the extent to which these adjustments change according to the time sensitivity of the industry in which a parent firm operates. The starting premise is that multinational firms operating in manufacturing are linked with their affiliates through parent-affiliate trade in intermediate and final goods. The time it takes for goods to reach parent firms from subsidiary plants abroad should influence the trade strategies of parent multinational firms.[5] Understanding the role of timeliness in global production networks and the heterogeneous response to timeliness by MNEs operating in different industries is important for understanding why a handful of countries have become dominant players in global manufacturing as well as why the characteristics of certain industries make them amenable to such production strategies.

The results from this study suggest that parent firms operating in manufacturing locate affiliate activities in countries with efficient shipping infrastructure. Long shipping lags reduce parent firms' import from (export to) affiliates. At the sectoral level, there exists some heterogeneity in the MNE's response to delays. When MNEs are ranked on a spectrum of time sensitivity, those operating in computers and machinery are shown to be the more time sensitive, with coefficients consistently surpassing those of other industries. Those operating in chemicals and metals appear less sensitive to delays, although results for the metal industry are not consistent across all estimates. The results are robust to changes in different measures of timeliness, trade activities between parent firms and affiliates and additional controls. Hence, countries that focus on reducing bottlenecks and building infrastructure that promote efficient and fast movement of goods across borders are not only promoting trade but more subtly, improving their participation in the global production networks in manufacturing.

Substantively, this paper and its findings are closely related to the growing literature

[5]Some theoretical discussions of the importance of timeliness to the global production network are found in the next section.

on timeliness and international trade that concludes that long shipping lags reduce trade volume. In a pioneering work, Hummels (2001) and Hummels and Schaur (2012) use U.S. import data to examine consumers' valuation of time through the premium paid on air shipping choice, which is fast but expensive relative to the slow but inexpensive ocean cargo. Their estimates suggest that a day in transit is equivalent to an ad-valorem tariff of 0.6 to 2.3 percent. They find that the most time sensitive trade flows are those involving trade in parts and components. Djankov et al. (2010) incorporates delays in a standard gravity model to measure the effect of export time on exports across countries. They use the number of days it takes to move goods from the factory gate to the shipping port as a measure of timeliness. They estimate that each day a product is delayed prior to shipping reduces trade by about 1 percent. For export of time sensitive agricultural goods in developing countries, the effect of delay is a 6% reduction in export volume. Evans and Harrigan (2005) argue that timely delivery is important because it allows retailers to respond to fluctuations in demand without costly inventories. This has an implication for agglomeration in that products that require timely delivery will be produced near the source of final demand.[6] The paper differs from the existing literature primarily in its attempt towards identifying causal linkages between time cost and parent firms' choice of affiliate abroad, and the sensitivity of firms of parent firms operating in different industries to delays.

This paper also relates to the literature on parent-affiliate integration decisions, (Yeats, 1998; Grubert and Mutti, 1991; Borga and Zeile, 2004; Hanson et al., 2005) that finds that tariffs, taxes, and transport costs limit integration decisions of U.S. multinational firms. It also provides some support to the literature on the effects of infrastructural development on trade and investment (Limao and Venables, 2001;

[6]Others have also discussed the importance of timeliness in trade. Nordas (2006) finds similar results. In his estimates, timeliness increases trade volume. He argues that labor intensive products such as clothing and electronics are increasingly becoming time sensitive. Hornok (2009) argues that saving an hour waiting at an inland border has a 0.4% ad-volorem tariff equivalent effect within the EU.

Clark et al., 2004) that finds that port efficiency and infrastructural development are important for bilateral trade.[7]

In the analysis, I do not attempt to distinguish the effects of timeliness on MNEs that integrate vertically (Helpman, 1984) from those that do so horizontally (Markusen, 1984). One can make the case that timeliness is useful in the case of the former, where outsourcing of cheap factors requires the sequential flow of goods between parent firms and their affiliates, and less applicable to the latter, where a firm's decision is to serve the domestic market and avoid any kind of physical exchange of goods between parents and affiliates.[8] With these caveats in mind, I believe that restricting the data on MNEs to those operating in manufacturing and trading with affiliates abroad mitigates the problem of obtaining nonsensical results. In practice however, as Borga and Zeile (2004) and Yeaple (2003a) argue and recent theoretical (Markusen, 2004) and empirical (Carr et al., 2001, 2003; Awokuse et al., 2012) developments of the knowledge-capital model of the multinational firm substantiate, location decisions are complex and an MNE may have production chains that form part of a network of sequential production across borders and other affiliates that exist to serve only local markets in either final inputs or intermediates.[9]

[7] Using the 1994 benchmark survey data from the Bureau of Economic Analysis (BEA), Borga and Zeile (2004) documents that the share of intermediate goods exported from U.S. parent firms to their affiliates increased from 8% of U.S. export in 1977 to about 15% in 1999. Budd et al. (2005) find substantial evidence of vertical trade between U.S. multinational firms and their affiliates. Yeats (1998) finds that intermediate input trade has grown faster than final goods trade. In manufacturing, his estimates suggest that intermediate input trade accounts for about 30% of world trade. In 1999, 93% of exports from U.S. parent firms to their subsidiaries in manufacturing were inputs for further processes.

[8] Goods are produced near the source of final consumption and any kind of outsourcing in done locally. Hence delays matter only to the extent that it impedes supply chain within that country or a neighboring country for which the host country serves as an export platform. A McDonald's franchise in Germany for instance will have little exchange of physical goods if at all with its parent headquarters in Illinois, U.S.A.

[9] Others have argued about the complex relationship between the firm's motive for integration decisions. For example, Alfaro and Charlton (2009) find that the extent of vertical trade between parent firms and their affiliates is missed at the 2-digit level since subsidiaries are supplying goods to their parents where both inputs and final goods are in the same 2-digit SIC code making it difficult to discern the pattern of vertical trade between parent firms and subsidiaries.

The remainder of the paper is organized as follows. Section 2 introduces some theoretical reasons for the importance of timeliness for MNEs integration decisions with affiliates. Section 3 presents the econometric model for the empirical estimation. Section 4 discusses the data, its limitations and presents some initial preliminary statistics on the variables of interest. Section 5 discusses the empirical results and key findings. Section 6 presents some sensitivity checks and section 7 concludes with some remarks on economic policy.

1.2 Why Time Matters to MNEs

Theoretically, there are several reasons why timely and efficient delivery of goods may matter for the integration decisions between parent firms and their affiliates. Hummels (2001) and Deardorff (2003) have discussed some potential importance for speed in global production and trade.

In a global manufacturing network, the production chain in one country depends on the efficient and timely delivery of inputs from plants in other countries. As parts and components move from one production plant to another, they make repeated trips across borders. If subsidiaries in a country with long shipping lags are part of the production chain, delays from those affiliates may impede the timing of the entire production chain. In the extreme case, excessive delays from a subsidiary may halt production as parent firms (or other affiliates) wait for parts and components to arrive. The effects are magnified when several countries are involved in the production process because delays will accumulate through the entire supply chain. To hedge against this risk, firms will have to invest heavily in keeping inventories, which is self-defeating to the ideas of lean retailing and supply chain management that both demand greater flexibility and the ability to adjust productivity to cut down on inventory costs.[10]

[10]In practice, goods may move from one affiliate to another within the same country before crossing borders to production plants abroad. Trade activities may also occur between affiliates without the involvement of a parent firm. The same argument may also hold for firms shipping to retailers in other

Timely delivery of products is especially important if parent-affiliate trade involves time sensitive goods where product life cycles are measured in weeks or days. The longer such goods stay in transit, the more they lose value. This is typical in electronics and computers, where new innovation and design consistently push current gadgets out of fashion, or perishable agricultural goods, where a product's lifespan are usually measured in days. In a sequential production process spanning multiple countries with several affiliates, value lost in transit in the early stages of production will accrue to the final stage. This means firms have to invest in preserving goods in transit or final output going to consumers has to be sold at a discount.

Improved technology and communication have also created a system where final consumers are no longer tolerant of delays that were previously acceptable. As discussed by Deardorff (2001), consumers change their tastes and preferences with surprising speed and firms have to adjust both what they produce and when they deliver it to the market with equal speed to match consumers' needs. Clothing retailers like Zara adopt a delivery approach that gives them an edge over competitors in an industry characterized by fickle fashion trends. For the same reason, many multinationals nowadays announce release dates of new products and honor their commitment to get them to the market on time. Firms that engage in global manufacturing networks that are located in countries with efficient shipping system can potentially benefit from industrial technology that is transferred through intermediate-inputs exchange. Ciccone (2002) shows that industrial technologies adaptation along the supply chain leads to an increase in productivity and aggregate income.

1.3 Empirical Estimations

For estimation purposes, let i index the host country (affiliates of parent multinational firms), k index the five industries (including aggregate manufacturing) and t

countries.

index the year. The U.S. is always the home country of the parent multinational firm and would be denoted by j. I model an outcome of interest, y_{it}^k, which could be U.S. parent firms' sales to or import from affiliates. I assume that the relationship between timeliness and sales or imports from affiliates takes the form:

$$ln(y_{it}^k) = \beta timecost_{it} + \pi' z_{it} + \gamma_t + u_{it}^k \tag{1.1}$$

The key covariate of interest is $timecost_{it}$, which for now, will be defined as the number of days it takes to get consignments from the factory gate to the shipping port and load them onto a ship within a given host country i in a particular year t. z_{it} is a vector of observable characteristics that are specific to the host country i at time t such as tariffs, host country's market size, corporate tax burden, manufacturing wages, land size, institutional quality and also distance (transport cost) and linguistic ties that are bilateral and time invariant between i and j. γ_t is a time trend that captures unobserved time variant characteristics that can influence trade between parent firms and affiliates (e.g. technology and growth of parent firms) and u_{it} is an error term. Variable selection and measurement is discussed in greater detail in section 1.4.

Some observations in the BEA data for parent firm's activities in the host countries are not reported due to confidentiality. After filtering those observations out, there are cases in which parent firms do not engage with affiliates in some countries for some years and hence have observations that are reported as zero. If these zero observations are based on observable characteristics that make the host country undesirable for investment in any particular year, using ordinary least squares (OLS) may lead to inconsistent estimates since only observations for which $u_{it}^k > -\pi z_{it}^k$ will be included in the sample for regression estimates. I therefore follow Hanson et al. (2005) and Awokuse et al. (2012) and employ a Tobit model specification and estimate the model using maximum likelihood. Collapsing $\beta timeCost_{it}$ and γ_t under πz_{it}, the Tobit estimation

is expressed as,

$$ln(y_{it}^k)^* = \pi^{'} z_{it}^k + u_{it}^k \tag{1.2}$$

$$ln(y_{it}^k) = \begin{cases} ln(y_{it}^k)^* & \text{if } \pi^{'} z_{it}^k + u_{it}^k > 0 \\ 0 & \text{if } \pi^{'} z_{it}^k + u_{it}^k \leq 0 \end{cases}$$

where $ln(y_{it}^k)^*$ is a latent variable and $ln(y_{it}^k)$ is realized trade activity between parent firm and their affiliates. If $\pi^{'} z_{it}^k + u_{it}^k$ is positive, parent firms will undertake positive integration activity with affiliates in host countries and when $\pi^{'} z_{it}^k + u_{it}^k$ is less than or equal to zero, realized integration activities of parent firms will be zero in the host country. Since it is not possible to take logs when zeros are included in the sample, I transform the dependent variable into $ln(y_{it}^k + 1)$ and estimate the model for each industry k. Except linguistic ties and Free trade agreement (FTA) that are binary variables, all the independent variables enter the equation in log form. The results are discussed in section 1.5. The coefficients presented are marginal effects evaluated at the sample mean.

1.4 The Data

1.4.1 Parent-Affiliate Activities

For empirical estimation, I collect data on U.S. parent firm activities with affiliates for 2006 and 2009 from the U.S. BEA, which collects publicly available comprehensive financial and operational data on U.S. multinational corporations and their affiliates located abroad. These data include sales to all foreign affiliates and import from all foreign affiliates. For reasons discussed in section 1.1, I restrict attention to the manufacturing industries in 5 sub-categories that include chemical products (chemicals), fabricated metals (metals), machinery, electronics & computer (computers) and electrical equipment.[11] Some features of this data are worth emphasizing. After filtering

[11]This allows me to exclude services and non-tradable activities such as real estate, hotels, technical services, insurance and financial services, which may rarely involve cross border trade. Similar

out regional groupings, the data are available for 62 countries but some countries do not have any observations. Dropping these countries leaves 55 countries with a total of 220 observations for the 4 years under consideration. The list of countries is presented in table 1.8. Tables 1.1 shows the share of U.S. parent firms' sales and import from affiliates by industry and region. Europe receives the bulk of parent firm's sales, followed by Asia and Pacific. 50 percent of total sales go to affiliates located in Europe. For all sales to Canada, metals and chemicals forms the highest share, of 12 and 8 percent respectively. This suggests the importance of proximity of Canada of affiliates in this industry. [12]

1.4.2 Timeliness

For each country and year, I extract corresponding measures of timeliness from the World Bank Doing Business website. I use both time to export and import for each country and year. Time is measured as the number of days it takes to export or import goods from the factory gate to the shipping port. The time calculation for a procedure starts from the moment it is initiated and runs until it is completed. In collecting the data, the survey assumes that neither the importer nor the exporter wastes time and each is committed to completing each remaining procedure without delay. Shipping procedures that can be completed in parallel are measured simultaneously. If time cost is measured by this standard, export time is 5 days in both Singapore (SGP) and Denmark (DNK). In Russia (RUS) and Venezuela (VEN), it is 36 and 45 days respectively in 2007. Hence, if a parent firm initiates an order from an affiliate in

approaches were used by Awokuse et al. (2012) and Hanson et al. (2005). For more information on the industry classification by the BEA see http://www.bea.gov/surveys/pdf/be799.pdf

[12]Canada and Mexico enjoy special trade agreements with the U.S. through the membership of North American Free Trade Agreement (NAFTA) which allows free movement of most manufacturing goods between them. The two countries enjoy closer geographic proximity to the U.S. especially in the case of Canada where proximity to the major automobile manufacturing centers. The United States-Canada Auto Agreements, dating back to 1965, gives Canadian affiliates a special advantage. Also, multinational firms engaged with affiliates in Mexico enjoy tariff exemptions from imported parts for re-export to the United States under provisions of the maquiladora program that preceded NAFTA.

Denmark or Singapore, it will take approximately 5 days for the goods to go through all customs procedures and get on board a ship whereas it will take approximately 36 days in Russia and 45 days in Venezuela.

For sensitivity analysis, I also use the logistic performance index, which captures freight forwarders perception of a country's logistics quality. This is the average of six indicators of logistic performance, including efficiency of the customs clearance process, quality of trade and transport infrastructure, ease of arranging competitively priced shipping, quality of logistic services, the ability to track and trace consignments, and the frequency with which shipments reach the consignee within the scheduled time. It is an index that ranges from 1 to 5, with 5 indicating the highest logistics quality. To make the expected signs of the logistic quality index coefficients consistent with the initial measure of timeliness, I recode this index by subtracting each country's score from 6 so that a value of 1 reflects the highest logistics quality and 5 reflects the lowest logistics quality. Positive perception of a country's overall logistics quality would be expected to be positively correlated with integration activities with affiliates in that country.

1.4.3 Other Covariates

Consistent with the literature on parent firms' integration with affiliates, I extract covariates from other sources to match the above dataset. Manufacturing tariff is obtained from the *World Development Indicators* (WDI) database 2011. I use the weighted mean applied tariff, which is the average of effectively applied rates weighted by the product import shares corresponding to each partner country for manufacturing products classified under section 5-8 of the *Standard International Trade Classification* (SITC) revision 3. Average wage rate is the ratio of total compensation paid to employees to the total number of wage salary workers in the host country obtained from the WDI. Real GDP, measured in 2005 dollars captures the host country's market size.

Land size captures the host country's total area measured in square kilometers excluding area under inland water bodies, national claims to continental shelf, and exclusive economic zones. I use the strength of the legal system in the host country to measure the quality of the host country's institution. It is an index that ranges from 1 to 10, with 10 indicating the highest strength of legal system. From the CEPII bilateral database provided by Head et al. (2010), I extract two other covariates. Linguistic ties is a binary variable that is one if English is the official language in the host country and zero otherwise. It proxies the effects of language and communication costs that parent firms incur to do business with affiliates abroad. Distance measured in kilometers indicates how far the host country is from the U.S. It captures the effect of trade and investment costs that parent firms incur abroad.

1.5 Results and Implications

Before presenting econometrics results, Figure 1.1 shows the relationship between total import from affiliates by parent firms and export time in the affiliates' home country. There is a negative correlation between the days to export and total import from affiliates. A similar pattern is observed when parent firms' sales to affiliates are plotted against the affiliates' country import time as shown in Figure 1.2. These plots suggest that all things equal, higher shipping time decreases sales to or import from affiliates. The preceding sections present formal tests using the Tobit model specified in section 1.3.

1.5.1 Shipping Time and Imports from Affiliates

Table 1.2 presents the estimation results of the effect of timeliness on U.S. parent firms' imports from their foreign affiliates for both total manufacturing and the 5 subcategories. In column (1) a 1 percent increase in shipping time decreases imports from affiliates by 3 percent. The magnitude of the coefficient is suggestive of the average

size of the effect of timeliness on import. Manufacturing wage has a negative and significant effect on parent firm's imports. A 1 percent increase in the wage paid to manufacturing workers reduces imports from affiliates by 1 percent. This is consistent with the literature on the comparative advantage motive of U.S. FDI in manufacturing, (Hanson et al., 2005; Yeaple, 2003b). Hence, as wage increases in the host country, parent firms decrease their activities with foreign affiliates. Imports from affiliates also increases with host country's market size with a 1 percent increase in market size increasing imports by 0.9 percent. The remaining columns from (2)-(6) perform similar estimations by sector. The objective is to examine if there are any heterogeneous responses to timeliness by the various industries under manufacturing after controlling for other observable characteristics. All coefficients on timeliness have the expected signs except in the metal industry. Relative to the chemical, metal and electrical industries, the negative effect of timeliness is higher on the machinery and computer industries. A 1 percent increase in shipping time decreases import by 3 percent in the machinery industry and 2 percent in the computer industry. The other covariates generally have the expected signs with conventional statistical significance at the 1 percent level. Overall, import from affiliates increases with the host country's market size and decreases with distance. A notable observation is the higher magnitude of the distance coefficients for the chemical and metal industries. A 1 percent increase in distance decreases imports from the chemical and metal industries by 1.7 and 1.9 percent respectively.

To confirm whether the pattern in the results above are representative, I perform some sensitivity analyses by adding additional control variables to those already presented in Table 1.2. The results are presented in Table 1.3. Although the magnitude of the coefficients on timeliness falls after controlling for linguistic ties, bilateral trade agreements and legal strength, the pattern observed in the previous estimates in Table 1.2 are quite representative. Except in the metal and chemical industries, long shipping lags reduce parent firms' import from foreign affiliates. The negative effect is higher on

the machinery and computer industries. A 1 percent increase in the time lag for shipping decreases import from foreign affiliates by 2.6 percent and 2 percent respectively in machinery and computer industries. Except in the computer industry, sharing a similar language increases parent firm's import but the coefficient reaches conventional statistical significance only in the chemical and electrical industries. Land size has a negative and statistically significant effect on imports from affiliates in all industries but chemicals. Similarly, free trade agreements increase parent firm's import from affiliates in the chemical and metal industries while legal strength has the expected positive sign in columns (1) and (6) for total manufacturing and electrical industries respectively.

1.5.2 Shipping Time and Sales to Affiliates

I repeat the estimation procedure in section 1.5.1 for parent firms' sales to foreign affiliates. The variable of interest is the number of days to import in the host country. Initial results are presented in Table 1.4. In column (1), timeliness has a negative effect on total sales to affiliates. A 1 percent increase in import time decreases sales to affiliates by 1 percent. The coefficient is significant at 1 percent. At the sectoral level, timeliness has no signficant effect on the chemical and metal industries. For the computer industry, a 1 percent increase in shipping time reduces sales to affiliates by 2.4 percent. In machinery, the reduction in sales is 1.7 percent. Consistent with the previous estimates, it appears that the negative correlation between timeliness and sales to affiliates is stronger for those two industries compared to the electrical, metals and chemicals industries. For the rest of the covariates, parent firms' sales to affiliates is increasing with rising host country's market size and decreasing with rising wage rate, host country's land size and bilateral distance between the host country and the United States.

To confirm the robustness of the initial effects of timeliness on parent firms' sales to affiliates obtained in Table 1.4, I repeat the estimation by adding additional controls

as that performed in Table 1.3. The results are presented in Table 1.5. Controlling for linguistic similarities, trade agreements, tariffs, and legal strength lead to a reduction in the magnitude of the initial coefficients on timeliness. In column (1), the coefficients of the covariates are suggestive of the average effect of timeliness on sales to affiliates. A 1 percent increase in shipping lags reduces sales by 0.7 percent. Sales to affiliates are increasing with host country's market size, common language, and trade agreements. In the computer industry, a 1 percent increase in delay decreases export by about 2.4 percent. The relatively large magnitude of this coefficient on machinery and computers is again suggestive of sensitivity to time of firms in those two sectors. In the chemical industry, timeliness has a negative effect on sales to affiliates with a conventional statistical significance at 10 percent. The effect of the other covariates on export follows a pattern similar to that in table 4. Land size has a negative and statistically significant effect on sales to affiliates in all industries except the metal industry. Sharing a similar language reduces communication and transaction costs and increases sales to affiliates. Large market size is also positively correlated with sales to affiliates. Parent firm's sales to affiliates also decreases with increases in host country's manufacturing wage, FTA agreements and transport costs as measured by distance.

1.5.3 Some Patterns and Possible Explanations

Estimation results suggest that time cost is negatively correlated with parent firms' trade activities with affiliates located abroad. At the sectoral level, the absolute magnitude of the coefficients on time are higher for the machinery and computer industry relative to the other industries. This suggests that firms operating in computers and electronics are more time sensitive compared to those operating in metals and chemicals. Another observed pattern is the higher distance elasticity for the metal and chemical industries. However, market size and manufacturing wages do not exhibit any uniform pattern across estimates by industry.

Some possible economic intuitions explaining these patterns come to mind. MNEs operating in computer products are known for their relatively wide outsourcing and integration activities. Product design generally involves headquarter activities whereas part and components assembly can span several countries. This is also the industry where new innovation and design consistently pushes current gadgets out of fashion. Borga and Zeile (2004) and Hanson et al. (2005) argue that the physical separability of of the production process in these industries makes them amenable to a global production process. These same characteristics may also make them more sensitive to time. If production and assembly are highly separable across several production plants and depreciation is a concern due to rapid innovation or short product life span, then firms in these industries have an incentive to ship products across affiliates and parents on time until goods reach the end user.

However, firms operating in metals and chemicals are characterized by products that are generally homogenous, heavy in weight, and less subject to depreciation as they wait in transit. Hence, while such products may be expensive to transport as shown by the large elasticity for distance in these industries, these inherent features mean that they may take more time in transit, making firms operating in these industries less concerned with speed. Further, the base products used in the metal and chemical industries are often derived from countries that are abundant in those resources, hence the range of parent firms' trade activities may be limited to countries with these resources, giving parent firms limited opportunities to be concerned about locating affiliates elsewhere.

1.5.4 Logistics Quality as a Measure of Timeliness

Tables 1.6 and 1.7 present estimation results that are similar to those presented in Tables 1.3 and 1.5 but use the logistic performance index recoded to make interpretation of the coefficients consistent with the previous measures of timeliness as an alternative measure of timeliness as discussed in section 1.4.2. Table 1.6 shows the

relationship between the overall quality of a country's shipping logistics and parent firms sales to affiliates in that country. In column (1), a 1 percent increase in the negative perception about logistic quality in the host country decreases parent firm's sales to foreign affiliates in that country by 1.3 percent. For the sectoral estimates in columns (2) through (6), we do not observe any significant effect of timeliness on sales to affiliates in the chemical and metal industry. The magnitude of the logistics quality coefficient is higher for the machinery and computer industry. The elasticity of distance is also higher for the chemical industry. Comparing the coefficients of the logistic performance index for Tables 1.6 and 1.7, they are much higher in Table 1.7, although the expected signs and signficance level generally follows a similar pattern for the 5 industries and aggregate manufacturing.

1.6 Conclusion

This paper uses data from the BEA on U.S. multinational firms operating in the manufacturing industry to analyze how timeliness induces parent firms to adjust their trade activities with affiliates located abroad, and how firms operating in different industries categorized under manufacturing respond to long shipping lags. The results show that parent firms trade more with affiliates located in countries that ship on time. Long shipping lags reduce parent firms' sales to (import from) foreign affiliates. At the sectoral level, there is substantial heterogeneity in the response to delays. When parent firms are ranked on a spectrum of time sensitivity, those operating in computers and machinery are shown to be the more time sensitive, with coefficients that surpass that of other industries. Those operating in metals and chemicals appear less sensitive to time, although results for the metal industry are not consistent across all estimates. The results remain robust to changes in different measures of timeliness, integration activities between parent firms and affiliates, estimation strategy and addition of other controls. Overall, the results suggest that trade infrastructure is important for integration activ-

ities between parent firms and their affiliates. Countries that focus on reducing lengthy shipping lags and building infrastructure that promotes the efficient and fast movement of goods across borders are not only promoting trade but more subtly, improving their participation in the global production networks in manufacturing.

1.7 Tables and Figures

Table 1.1: Sales by U.S. Parent Firms to Affiliates by Industry and Region (%)

Industry	Mexico	Africa	Asia and Pacific	Canada	Europe	Western Hemis.	Middle East
Chemicals	4.81	0.90	20.59	7.91	51.86	12.00	1.93
Metals	2.49	0.72	17.01	12.36	58.55	8.51	0.36
Machinery	-	-	-	5.25	56.22	8.87	1.28
Electronics	3.87	0.05	49.26	1.89	41.03	6.29	1.47
Electrical Equipment	-	0.67	17.96	6.68	-	-	-
Total Manufacturing	5.17	0.91	24.54	11.30	44.74	11.35	1.98

Note: "-" means that calculation could not be performed because the data are not available or are suppressed to avoid disclosure of data by individual companies. In that instance, the sum of the shares for each industry across regions do not add up to 100. Source: Authors' calculation using data from the U.S. Bureau of Economic Analysis.The Data is for 2006.

Table 1.2: Export Time and Import from Foreign Affiliates

VARIABLES	Total	Chemicals	Metals	Machinery	Computers	Electricals
	(1)	(2)	(3)	(4)	(5)	(6)
Timeliness	-3.046***	-0.265	0.200	-3.221***	-2.317***	-2.121***
	(0.720)	(0.708)	(0.260)	(0.446)	(0.763)	(0.404)
Wage Rate	-1.025**	-0.479	0.140	-0.250	-2.424***	-1.035**
	(0.490)	(0.593)	(0.228)	(0.254)	(0.587)	(0.443)
Market Size	0.877***	0.805**	1.678***	1.327***	1.091***	2.084***
	(0.230)	(0.359)	(0.118)	(0.215)	(0.372)	(0.187)
Distance	-1.972***	-1.706***	-1.897***	-1.235***	-0.670**	-0.603***
	(0.184)	(0.353)	(0.708)	(0.172)	(0.330)	(0.204)
Land Size	-0.127	0.007	0.184	-0.113	-0.482*	-0.311**
	(0.140)	(0.140)	(0.134)	(0.091)	(0.266)	(0.120)
Observations	76	71	65	83	62	47
Log Likelihood	-158.301	-150.090	-90.673	-155.023	-137.325	-71.411
R-square	0.101	0.138	0.344	0.210	0.0898	0.328

Note: Timeliness is measured as host country's days required to export. Marginal effects are evaluated at sample mean and pseudo R-square values are reported. All regressions include year and host country fixed effects that are not reported. Robust standard errors are in parenthesis. *, ** and *** indicates significance at 10%, 5%, and 1% respectively.

Table 1.3: Export Time and Import from Foreign Affiliates

VARIABLES	Total	Chemicals	Metals	Machinery	Computers	Electricals
	(1)	(2)	(3)	(4)	(5)	(6)
Timeliness	-2.420***	-0.296	0.143	-2.638***	-1.926*	-0.180***
	(0.676)	(0.390)	(0.278)	(0.494)	(1.150)	(0.038)
Wage Rate	-1.239**	-0.747	0.299	-0.318	-2.881***	0.060
	(0.497)	(0.607)	(0.249)	(0.308)	(0.688)	(0.710)
Market Size	1.064***	0.452	1.610***	1.478***	1.287***	1.934***
	(0.222)	(0.282)	(0.137)	(0.182)	(0.439)	(0.216)
Distance	-0.031	-2.062***	-1.797**	-0.796***	-0.833	0.360
	(0.524)	(0.435)	(0.700)	(0.296)	(0.540)	(0.306)
Land Size	-0.133	-0.079	-0.200*	-0.267**	-0.424*	-0.529***
	(0.150)	(0.144)	(0.118)	(0.119)	(0.218)	(0.105)
Linguistic Ties	0.080	1.434***	0.175	0.569	-0.303	1.908**
	(0.553)	(0.536)	(0.459)	(0.517)	(1.023)	(0.892)
FTA Agreement	0.262	3.042***	1.029***	-0.114	-1.143	0.528
	(0.692)	(1.135)	(0.382)	(0.500)	(1.211)	(0.451)
Legal Strength	0.354**	-0.059	0.050	0.180	0.372	0.387**
	(0.137)	(0.154)	(0.099)	(0.132)	(0.253)	(0.167)
Observations	76	71	65	83	62	47
Log Likelihood	-152.208	-141.251	-88.255	-155.145	-134.132	-69.957
R-square	0.132	0.189	0.362	0.209	0.111	0.386

Note: Timeliness is measured as host country's days required to export. Marginal effects are evaluated at sample mean and pseudo R-square values are reported. All regressions include year and host country fixed effects that are not reported. Robust standard errors are in parenthesis. *, ** and *** indicates significance at 10%, 5%, and 1% respectively.

Table 1.4: Import Time and Sales to Foreign Affiliates

VARIABLES	Total	Chemicals	Metals	Machinery	Computers	Electricals
	(1)	(2)	(3)	(4)	(5)	(6)
Timeliness	-1.082***	-0.098	-0.375	-1.672***	-2.400***	-1.385**
	(0.266)	(0.629)	(0.669)	(0.400)	(0.466)	(0.602)
Wage Rate	0.179	-0.117	-0.851***	-0.774**	-1.086***	-0.443
	(0.199)	(0.389)	(0.265)	(0.363)	(0.362)	(0.362)
Market Size	1.071***	0.722***	1.763***	1.200***	0.799***	1.268***
	(0.094)	(0.184)	(0.152)	(0.168)	(0.280)	(0.255)
Distance	-0.339*	-0.838***	-0.301	-0.188	-0.416	-0.683*
	(0.204)	(0.256)	(0.250)	(0.171)	(0.455)	(0.360)
Land Size	-0.097	-0.111	-0.055	-0.127*	-0.461***	-0.473**
	(0.065)	(0.094)	(0.092)	(0.074)	(0.141)	(0.188)
Observations	90	78	65	81	71	69
Log Likelihood	-122.819	-139.517	-99.615	-134.093	-157.013	-137.227
R-Square	0.372	0.223	0.317	0.301	0.0864	0.158

Note: Timeliness is measured as host country's days required to import. Marginal effects are evaluated at sample mean and pseudo R-square values are reported. All regressions include year and host country fixed effects that are not reported. Robust standard errors are in parenthesis. *, ** and *** indicates significance at 10%, 5%, and 1% respectively.

Table 1.5: Import Time and Sales to Foreign Affiliates

VARIABLES	Total	Chemicals	Metals	Machinery	Computers	Electricals
	(1)	(2)	(3)	(4)	(5)	(6)
Timeliness	-0.736***	-0.525*	0.111	-1.172***	-2.403***	-0.568**
	(0.236)	(0.264)	(0.637)	(0.296)	(0.819)	(0.257)
Wage Rate	-0.052	-0.758*	-1.132***	-1.077***	1.500	-2.015***
	(0.286)	(0.442)	(0.337)	(0.370)	(0.944)	(0.525)
Market Size	0.978***	0.461**	1.855***	1.144***	0.566	1.147***
	(0.132)	(0.196)	(0.186)	(0.174)	(0.379)	(0.249)
Distance	-0.463**	-1.231**	-0.483	-0.047	-0.312	-0.467
	(0.201)	(0.484)	(0.299)	(0.235)	(0.365)	(0.418)
Land Size	-0.140**	-0.271**	0.008	-0.234***	-0.813***	-0.458***
	(0.066)	(0.121)	(0.137)	(0.085)	(0.154)	(0.146)
Linguistic Ties	0.560*	2.634***	0.019	0.345	1.090	2.385***
	(0.322)	(0.707)	(0.652)	(0.413)	(0.990)	(0.657)
FTA Agreement	-0.862***	-0.879*	-0.320	-0.027	-2.719***	-1.995**
	(0.291)	(0.457)	(0.380)	(0.251)	(0.880)	(0.977)
Tariffs	0.004	-0.149	0.011	-0.130	0.764	0.613**
	(0.127)	(0.280)	(0.266)	(0.269)	(0.549)	(0.285)
Legal Strength	0.105	-0.414***	0.151	0.025	0.239	0.044
	(0.099)	(0.144)	(0.144)	(0.109)	(0.254)	(0.140)
Observations	80	74	59	75	62	62
Log Likelihood	-97.201	-120.344	-86.899	-116.786	-129.415	-107.105
R-Square	0.448	0.300	0.348	0.340	0.147	0.280

Note: Timeliness is measured as host country's days required to import. Marginal effects are evaluated at sample mean and pseudo R-square values are reported. All regressions include year fixed and host country fixed effects that are not reported. Robust standard errors are in parenthesis. *, ** and *** indicates significance at 10%, 5%, and 1% respectively.

Table 1.6: Logistics Quality and Sales to Foreign Affiliates

VARIABLES	Total	Chemicals	Metals	Machinery	Computers	Electricals
	(1)	(2)	(3)	(4)	(5)	(6)
Logistics Quality	-1.259***	-0.706	-1.217	-1.955***	-1.786***	-1.232**
	(0.342)	(0.592)	(0.891)	(0.512)	(0.498)	(0.589)
Wage Rate	0.110	-1.725**	-0.631	-0.930***	1.417	-2.226***
	(0.289)	(0.783)	(0.593)	(0.324)	(0.951)	(0.543)
Market Size	0.887***	-0.022	0.947**	1.118***	0.649*	1.193***
	(0.134)	(0.280)	(0.392)	(0.159)	(0.348)	(0.249)
Distance	-0.448***	-1.066*	-0.545	0.072	-0.804	-0.540
	(0.166)	(0.544)	(0.408)	(0.220)	(0.505)	(0.424)
Land Size	-0.115**	-0.277	0.587**	-0.221**	-0.833***	-0.521***
	(0.057)	(0.231)	(0.239)	(0.088)	(0.162)	(0.140)
Linguistic Ties	0.507	2.669**	0.080	0.014	1.120	2.452***
	(0.309)	(1.255)	(0.769)	(0.389)	(1.022)	(0.667)
FTA	-0.848***	-1.152**	0.665	0.102	-2.392***	-2.077**
	(0.269)	(0.560)	(0.551)	(0.324)	(0.891)	(0.990)
Tariff	0.080	0.030	0.129	0.025	0.290	0.510*
	(0.109)	(0.536)	(0.342)	(0.256)	(0.531)	(0.285)
Legal Strength	0.079	-0.505*	0.071	0.026	0.264	0.116
	(0.096)	(0.271)	(0.190)	(0.092)	(0.265)	(0.145)
Observations	80	74	59	75	62	62
Log Likelihood	-94.251	-153.992	-121.973	-113.272	-132.249	-106.650
R-square	0.465	0.104	0.0854	0.360	0.129	0.283

Note: Marginal effects are evaluated at sample mean and pseudo R-square values are reported. All regressions include year and host country fixed effects that are not reported. Robust standard errors are in parenthesis. *, ** and *** indicates significance at 10%, 5%, and 1% respectively.

Table 1.7: Logistics Quality and Import from Foreign Affiliates

VARIABLES	Total	Chemicals	Metals	Machinery	Computers	Electricals
	(1)	(2)	(3)	(4)	(5)	(6)
Logistics Quality	-3.108***	-0.414	0.218	-4.773***	-4.278***	-2.866***
	(0.650)	(0.658)	(0.397)	(0.838)	(1.008)	(0.653)
Wage Rate	-1.275***	-0.122	0.266	0.225	-2.925***	0.088
	(0.452)	(0.583)	(0.277)	(0.237)	(0.700)	(0.660)
Market Size	0.902***	0.172	1.620***	1.342***	1.074**	1.569***
	(0.207)	(0.300)	(0.139)	(0.185)	(0.429)	(0.275)
lgdist	-0.585	-1.975***	-1.526**	-0.876***	-1.693**	-0.797***
	(0.529)	(0.414)	(0.643)	(0.277)	(0.744)	(0.219)
Land Size	-0.024	-0.015	0.214	-0.029	-0.450	-0.559***
	(0.124)	(0.132)	(0.147)	(0.099)	(0.275)	(0.094)
Linguistic Ties	0.118	1.531***	0.266	0.194	-0.496	2.090***
	(0.534)	(0.548)	(0.423)	(0.491)	(1.016)	(0.554)
FTA	-0.047	-2.489**	-1.009**	-0.401	-0.893	0.860*
	(0.733)	(1.041)	(0.424)	(0.604)	(1.286)	(0.510)
Legal Strength	0.373***	-0.208	0.043	0.071	0.325	-0.172
	(0.131)	(0.161)	(0.092)	(0.093)	(0.235)	(0.153)
Observations	76	71	65	83	62	47
Log Likelihood	-146.814	-137.967	-88.212	-141.915	-134.605	-71.119
R-square	0.163	0.208	0.362	0.277	0.108	0.331

Note: Marginal effects are evaluated at sample mean and pseudo R-square values are reported. All regressions include year and host country fixed effects that are not reported. Robust standard errors are in parenthesis. *, ** and *** indicates significance at 10%, 5%, and 1% respectively.

Table 1.8: List of Host Countries

Argentina(ARG)	Italy(ITA)
Australia(AUS)	Japan(JPN)
Austria (AUT)	Korea, Rep.(KOR)
Barbados(BRB)	Luxembourg(LUX)
Belgium (BEL)	Malaysia(MYS)
Bermuda (BMU)	Mexico (MEX)
Brazil (BRA)	Netherlands(NLD)
Canada (CAN)	New Zealand(NZL)
Chile (CHL)	Nigeria (NGA)
China (CHN)	Norway (NOR)
Colombia(COL)	Panama(PAN)
Costa Rica(CRI)	Peru(PER)
Czech Republic(CZE)	Philippines(PHL)
Denmark (DNK)	Poland (POL)
Dominican Republic(DOM)	Portugal(PRT)
Ecuador (ECU)	Russian Federation(RUS)
Egypt, Arab Rep.(EGY)	Saudi Arabia(SAU)
Finland (FIN)	Singapore(SGP)
France (FRA)	South Africa(ZAF)
Germany (DEU)	Spain (ESP)
Greece (GRC)	Sweden (SWE)
Honduras(HND)	Switzerland(CHE)
Hong Kong SAR, China(HKG)	Thailand(THA)
Hungary (HUN)	Turkey(TUR)
India (IND)	United Arab Emirates(ARE)
Indonesia(IDN)	United Kingdom(GBR)
Ireland (IRL)	Venezuela, RB(VEN)
Israel (ISR)	

Figure 1.1: Imports from Affiliates and Export Time, 2009

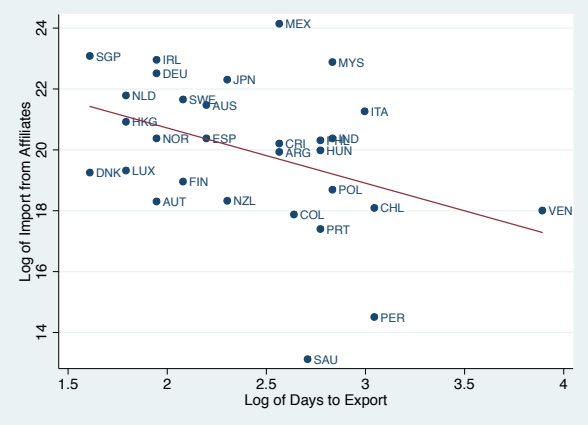
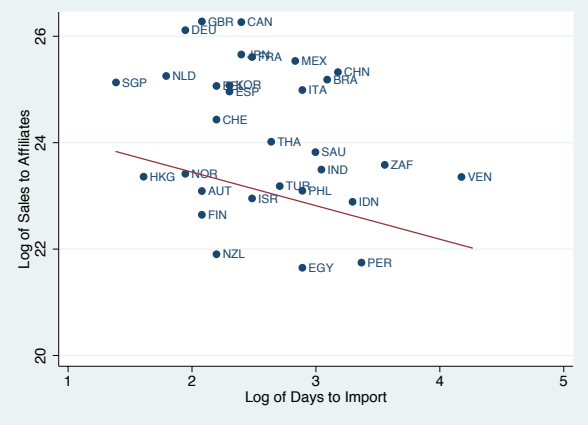


Figure 1.2: Sales to Affiliates and Import Time, 2007



Chapter 2

Market Access for South vs. North: A Product Level Investigation

2.1 Introduction

One of the most contentious issue in multilateral trade negotiations is the effect of trade costs on market access for developing countries. After the success of the Uruguay round in lowering tariff barriers around the world, the World Trade Organization (WTO) issued a report entitled "Market Access: Unfinished Business-Post Uruguay Round Inventory and Issues" in 2001, that evaluated and clarified ongoing trade negotiations in the market access area, but trade negations since the WTO Ministerial Conference of 2003 in Cancùn have failed to yield a general consensus. The so called "North-South divide," is often cited as part of the failure of these trade negotiations. China, India, Brazil, and South Africa continue to press for better market access terms for South exporters, arguing that the Common Agricultural Policy of the EU and the U.S. agro-subsidies do not favor the market access success of exporters in developing countries.

As multilateral trade talks continue at the policy front, empirical research in international trade has gained momentum in the analysis of the effects of trade frictions on the

extensive and intensive margins of export (Tarasov, 2012; Buono and Lalanne, 2012). One issue that has received very little attention in the literature is whether the effects of market access barriers as observed in the data are different for South and North exporters accessing the same destination market. In a recent paper, Waugh (2010) argue that to reconcile bilateral export and price data across countries, trade frictions for South vs. North countries must be systematically different, with poor countries consistently facing higher frictions than rich countries. In this paper, we search the data for the presence of any such systematic development related bias, where South exporters face higher market access friction relative to North exporters. We use detailed differentiated product level data for 144 commodities and 127 countries, and construct observable measures of trade cost that capture both fixed and variable costs of export.

To empirically test this hypothesis, we employ a heterogeneous firms trade model developed by Helpman et al. (2008) that has some advantages suited for that purpose. First, we are able to embed fixed and variable trade costs in the model and test for their effects on the extensive and intensive margins of export using a two-step estimation framework. In the first stage, both fixed and variable costs affect firm's success in entering export markets and upon successful entry, variable cost affects their export volume in the second stage (since firms incur fixed cost in their decision to enter the market only). Secondly, the model allows us to account for the effect of the fraction of firms that export in each market, which is especially important when comparing South and North exporters. Even in developed markets, few firms are known to engage in international trade (Bernard et al., 2007), and the fraction of exporters is much likely to be lower in developing countries. Finally, the model allows us to control for sample selection bias that may influence our results when only non-zero trade observations are used in estimating the effect of trade cost on export volume. If in fact zero trade volume is a result of observable features of either the importing or exporting country, it is important to account for the bias they cause when only positive observations are used in the estimation.

The results show that at the extensive margin, where we compare the effects of observable fixed and variable costs on the probability of success in entering export markets, South exporters appear to face higher costs of export relative to North exporters although the difference in cost for South vs. North is not quite substantial. However, at the intensive margin, where we examine the effect of observable variable cost on the export volume of South exporters who successfully penetrate export market we find substantial South-North bias with coefficients of cost differences for South vs. North variable costs ranging from -0.429 and -0.421 at the disaggregate level and -0.367 and -0.382 at the aggregate level.

This paper contributes to a growing empirical literature on market access and trade frictions. It is closely related to the work of Waugh (2010), who uses a general equilibrium model in the spirit of Eaton and Kortum (2002) to analyze how income levels affect trade costs. He finds that trade costs are negatively related to a country's development level, such that poor countries face higher market access friction relative to rich countries. Using a model of economic geography, Redding and Venables (2004) argue that the geography of market access plays an important role in explaining cross-country difference in income. Very distant countries pay higher export costs as well as higher import costs for input and capital equipment. Hence firms located in these countries pay relatively lower wages, leading to lower living standards. However, unlike Waugh (2010), we use data on the export cost per unit and the number of procedures to register a property to capture variable and fixed costs of export, we also use detailed differentiated product level data for 144 commodities that may be more consistent with models of heterogeneous firms.

The paper also provides some support for the literature on the fixed costs of trade. Both theoretical and empirical studies have documented the importance of fixed costs of trade in successfully entering export markets. In the now-classical Melitz (2003) model, the most productive firms which are able to sink initial entry costs enter export markets; less productive firms produce domestically, while the least productive firms exit the

market. Clerides et al. (1998) and Das et al. (2007) show that firms are concerned about export costs that are fixed in nature in addition to per unit cost. Firms decide to sink an initial investment to enter export markets today only if expected future profit will be able to cover these costs. In their estimation for Columbian firms, entry costs are larger for smaller producers than for larger producers. Fixed costs include the resources used in forming distributive and sales networks, maintaining warehouses, information flows, and establishing legal contracts with economic agents such as suppliers and government officials. While these findings demonstrate the importance of fixed costs for market entry, rarely do gravity models account for such costs. We rely on recent data on trade cost available across countries to investigate the effect of fixed costs on export market participations.[1]

Finally, our paper is also related to the recent literature on zero trade. It is well noted that zero observations are highly present in developing countries export. Aside the problem of sample selection bias, gravity models that use only positive trade are not able to account for the extensive margin of export. Thus the coefficient on distance or any other measures of trade cost only captures shipping cost. Exception includes Baldwin and Harrigan (2011). Using disaggregated US bilateral data and a modified version of the Melitz (2003) models that incorporate preference for quality, they examined how importer's market size and bilateral distance explains the spatial patterns of zeros in bilateral trade data. Silva and Tenreyro (2006) and Eaton et al. (2011) argue that while zero trade may not affect estimation of bilateral trade for large economies within broad sectors, zeros are quite common between smaller countries.

The reminder of the paper proceeds as follows. Section 2 outlines the HMR model that yields our two-stage estimation framework for estimating our export participation

[1]Das et al. (2007) consider distribution channels, learning bureaucratic procedures, adaptation of products and packages for foreign markets, monitoring foreign custom procedures, and local product standards. In addition, social network and transnational business promotes international trade by removing barriers of contract enforcement and providing information about trading opportunities (e.g., Rauch (2001)). Intermediaries are also important in foreign firms entering markets that are more difficult to penetrate Ahn et al. (2011).

and trade flow equation. Section 3 provides an in-depth discussion of our trade flow data and North-South classification as well our various measures of fixed and variable costs. Section 4 presents the empirical results of our estimates from both aggregate and commodity level data and discussion of our results. Section 5 presents some sensitivity checks and section 6 concludes.

2.2 The Model

To perform our empirical estimation, we use a version of the gravity equation derived form a heterogeneous firms trade model proposed by Helpman et al. (2008). The model yields a two stage-estimation framework in which trade costs determine market access in the first stage (intensive margin) and upon successful entry trade cost determines the effect on export volume.

Consider a set of N countries indexed by $i, j = 1, 2, ..., N$, with N_c firms in each country i. There are several product categories, but each firm c produces one variety within a given category. For notational simplicity, we suppress the product index but all the theoretical development applies to each product. In country i consumers have a Dixit-Stiglitz utility function of the following form:

$$U_i = \left[\sum_{\theta \in \beta_i} q_i(\theta)^{\alpha} d\theta\right]^{\frac{1}{\alpha}}$$

Here, $q_i(\theta)$ is $i's$ consumption of variety θ, β_i is the mass of varieties available for consumption and α determines the elasticity of substitution across varieties such that $\varepsilon = 1/(1-\alpha) > 1$. Then, the demand function for variety θ in i can be derived as:

$$q_i(\theta) = \frac{p_i(\theta)^{-\varepsilon} Y_i}{(P_i)^{1-\varepsilon}}$$

where p_i is the price of variety θ, Y_i is real income, and P_i is the average price in country i over all varieties in set β_i.

In country j, each firm produces one unit of output using a Ricardian technology with unit cost c_j/a_j, where $1/a_j$ is firm-specific productivity measure such that a higher value of $1/a_j$ indicates higher productivity for the firm and c_j is country-specific cost of production per unit. We assume that a_j is drawn from a Pareto distribution of the form $G(a_j) = (a_j^k - a_{LJ}^k)/(a_{Hj}^k - a_{LJ}^k)$ where $k > \varepsilon - 1$. $G(a_j)$ has a country-specific support of $[a_{Lj}, a_{Hj}]$ such that $a_{Hj} > a_{Lj} > 0$. When a firm in country j sells its product to consumers in i, it incurs a fixed cost of export $f_{ij} > 0$ and variable transport cost $\tau_{ij} > 1$. Hence, a monopolistic competitive firm in j would choose a mark-up price $p_{ij}(\theta) = (\tau_{ij}c_j a)/a_j$ which is adjusted for transport cost. Hence, a firms in j with productivity level a_j that succeeds in serving a foreign market i would have a profit function of the form:

$$\pi_{ij}(a_j) = (1-\alpha)\left(\frac{\tau_{ij}c_j a_j}{\alpha P_i}\right)^{1-\varepsilon} Y_i - f_{ij} \tag{2.1}$$

2.2.1 First Stage Estimation: Extensive Margin

Since the Melitz (2003) model predicts systematic self-selection of firms into export market based on firms' specific productivity measures $(1/a_j)$, export to i from j would depend only on the most productive firms in j. Consider two monopolistic competitive firms such as Apple and Dell that attempt to penetrate the export market in Burkina Faso and Ghana. Assuming the most product firm is Apple, it would export to Ghana if it is able to obtain a positive profit as specified in equation (2.1). However, to serve the market in Burkina Faso, Apple has to incur significant transport cost to reach the landlocked country, where it has to incur further fixed costs to establish distribution networks and warehouses. If Apple, the most productive firm, fails to enter the computer market in Burkina Faso, then Dell, the second most productive firm, would also fail to enter the market in Burkina Faso. Thus, for the most productive

firm whose productivity is given by (a_{Lj}) we can define a variable:

$$Z_{ij}(a_{Lj}) = (1-\alpha)\left(\frac{\tau_{ij}c_j}{\alpha P_i}\right)^{1-\varepsilon}\frac{(a_{Lj})^{1-\varepsilon}Y_i}{f_{ij}} \tag{2.2}$$

This is the ratio of variable profit from export to the fixed cost of export for the most productive firm exporting from j to i. We define $T_{ij} = 1$ if there is positive profit from exporting for the most productive firm such that $z_{ij}(a_{Lj}) = ln[Z_{ij}(a_{Lj})] > 0$, and $T_{ij} = 0$ if this firm fails to enter country $i's$ market. We define fixed cost for exporting as:

$$ln(f_{ij}) = \lambda_0 + \lambda_1 ln(FC_i) + \lambda_2 ln(FC_i) + \lambda_i + \lambda_j - v_{ij} \tag{2.3}$$

where $ln(FC_i)$ and $ln(FC_j)$ are the importer's and exporter's fixed costs of import and export respectively that are observable, λ_i and λ_j are country specific fixed costs for exporting and v_{ij} is a disturbance term. Further we define variable cost as:

$$(\varepsilon-1)ln(\tau_{ij}) = \gamma_0 + \gamma_1 ln(d_{ij}) + \gamma_2 ln(VC_i) + \gamma_3 ln(VC_j) + \gamma_i + \gamma_j - u_{ij} \tag{2.4}$$

where d_{ij} is bilateral distance, VC_i and VC_j are importer and exporter freight handling costs respectively, and γ_i and γ_j are the remaining country-specific variable costs of trade. Using equation (2.2) and summing up FC (fixed cost) and VC (variable cost) for i and j, we can specific a linear probability model:

$$P_{ij} = P(T_{ij} = 1 | ln(FC_{ij}), , ln(d_{ij}), ln(VC_{ij}), \eta_i, \eta_j, \eta_{ij}) \tag{2.5}$$

where $\eta_{ij} = ln(1-\alpha) - (1-\varepsilon)ln(\alpha) - \lambda_0 - \gamma_0$, $\eta_j = (1-\varepsilon)ln(c_j) - \lambda_j - \gamma_j$ and $\eta_i = (\varepsilon-1)ln(P_i) + ln(Y_i) - \lambda_i - \gamma_i$.

Since our interest is in how fixed and variable costs affect firms' successfulness in entering export markets, and whether there is any systematic bias for South export to North markets, we augment equation (2.5) by interacting trade costs measures with

South-North (SN) dummies as follows:

$$P_{ij} = P(T_{ij} = 1 | ln(FC_{ij}), ln(FC_{ij}) * SN, ln(d_{ij}), ln(d_{ij}) * SN, ln(VC_{ij}), \\ ln(VC_{ij}) * SN, \eta_i, \eta_j, \eta_{ij}) \tag{2.6}$$

Note that equation 2.6 depends only on the market access decision of the most productive firm. Fixed and variable costs for trade are primary factors of the probability of successful entry into a foreign market after controlling for exporter (η_j) and importer (η_i) fixed effects that capture the market size, the most productive firms' productivity levels, unit production costs, and the average price in importing country i. The linear probability model (LPM) in equation (2.6) represents our first stage estimation equation. It estimates the effect of both fixed and variable trade costs on the probability of entry into export markets. If there is no systematic bias between South and North, we expect the elasticity of trade costs to be identical for both North and South after controlling for exporter and importer fixed effects. Helpman et al. (2008) use the probit model; However to avoid the incidental parameter problem that prevents us from including the South and North fixed effect dummies, we use the LPM estimation strategy following Baldwin and Harrigan (2011).

2.2.2 Second Stage Estimation: Intensive Margin

Helpman et al. (2008) point out that the conventional gravity equation as specified by Anderson and Van Wincoop (2004) does not account for the fraction of firms that actually export from country j to i. However, as the Melitz (2003) model specifies, only a fraction of firms in country j that are productive enough to have positive profits in country $i's$ exports. The cutoff productivity level is defined by setting $\pi_{ij}(a_{ij}) = 0$. As long as firm's productivity is higher than its cutoff one ($a_{ij} > a_j$), exporters from j have positive profit in country i. We therefore express the bilateral volume of export

from country j to i as:

$$M_{ij} = \left(\frac{\pi_{ij} c_j}{\alpha P_i}\right)^{1-\varepsilon} Y_i N_j V_{ij} \tag{2.7}$$

where $V_{ij} = \frac{K a_{Lj}^{k-\varepsilon+1}}{(k-\varepsilon+1)(a_{Hj}^{k} - a_{Lj}^{k})} W_{ij}$, and $W_{ij} = \{\max Z_{ij}^{(k-\varepsilon+1)/(\varepsilon-1)} - 1, 0\}$.

The predicted probability of success is obtained from estimating equation (2.6).[2] Using the predicted values, Helpman et al. (2008) show that we can construct $\hat{w}_{ij}^{*} = \ln\{\exp[\delta(\hat{z}_{ij}^{*} + \hat{\eta}_{ij}^{*})] - 1\}$ and $\beta_{uv}\hat{\eta}_{ij}^{*}$ ($\hat{\eta}_{ij}^{*}$ is the inverse mills ratio) that respectively control for unobserved firm heterogeneity and sample selection bias in a gravity equation that estimates the effect of trade costs on bilateral trade flows. To get around the problem of convergence for 144 commodities when using nonlinear least squares, we use the δ values from Helpman et al. (2008) and estimate our second stage by OLS. Hence we can obtain a consistent second stage estimation that captures the effect of variable trade costs on bilateral trade volume from equation 2.7 as follows:

$$\begin{aligned} M_{ij} =& \beta_0 - \gamma_1 ln(d_{ij}) - \gamma_2 ln(d_{ij}) * SN - \gamma_3 ln(VC_{ij}) - \gamma_4 ln(VC_{ij}) * SN \\ &+ \beta_i + \beta_j + \hat{w}_{ij}^{*} + \beta_{uv}\hat{\eta}_{ij}^{*} + e_{ij} \end{aligned} \tag{2.8}$$

Notice that the fixed cost variable (FC_{ij}) do not enter equation (2.8). This is because fixed costs are borne during market access entry so that after firms enter the market, the only concern for firm is the variable cost of export.

2.3 The Data

2.3.1 Overview

Consistent with a model of heterogeneous firms' trade in differentiated products, we follow Rauch (1999) and use differentiated products for our empirical estimation. We extract bilateral import data from the UN Comtrade at the 3-digit of the Standard

[2]Where the predicted value is greater than 1, we replace it with 0.9999 and where it is less than 0, we replace it with 0.0001

International Trade Classification (SITC) revision 3.[3] We filter our dataset to include commodities for which a reporter imports from at least one partner. This eliminates the problem of including commodities for which no positive trade value is observed in the entire sample. We have 2,304,288 potential bilateral trade observations from a sample that consists of 144 products for 127 countries in the year 2006. 1,610,387 (70%) of these possible observations are zero. This highlights the high presence of zeros in trade data at a detailed level of product disaggregation. The proportion of zeros trade is even higher for exporters in South countries. For S-N (South export to North) sample, we have 580,608 potential trade pairs, of which 461,855 (80%) are zeros, whereas our N-N (North countries export to other North countries) sample has 580,608 potential observations for which 260,553 (45%) have zero values.[4]

2.3.2 Fixed and Variable Costs of Trade

For each bilateral pair, we construct corresponding measures of trade costs that allow us to capture the effects of variable and fixed trade costs on market access and export volume. First, as standard in the gravity equation, we use distance to capture transport cost. We construct a measure of variable cost of export using the additive values of the importers' import cost per/20-footer containers and the corresponding exporters' export cost per/20 footer container. These cost measures capture the within border variable costs to ship a container, such as port charges, the resources required for

[3]Import data are argued to be more precise in the data than export data due to the need for governments to inspect imported products for tariffs and import duties and for contrabands. See Tarasov (2012) and Felbermayr and Kohler (2006)

[4]UN Comtrade does not provide any means of verifying whether missing data are genuinely zero or not reported but simply treat unreported data as missing. Felbermayr and Kohler (2006) argue that about 80% of all missing data in trade data are truly missing. However, the usual caveat that missing data may not be truly zero applies. Some countries report positive trade only when export of a particular commodity is above a given cutoff value. In compiling monthly merchandise trade, export cutoff value was $2,500 for the United States in 1992 and shippers export declaration are not required for transactions of less than that amount Kester (1992). However, restricting our sample to a case where at least a partner import from one market necessitates that the product is produced in the exporting country.

preparing and storing cargo and the loading and unloading of cargo. They vary with the volume of export and would likely influence the probability of success in entering export markets as well as the trade volume upon successful entering into a particular market. Next, we use the additive values of the exporters' and importers' cost of business start-up to measure the fixed costs of export. These measures include the resources spent on administrative and regulation procedures that do not vary with export volume, establishing distributive and contract networks, and following legal requirements in both the importing and exporting countries. Fixed costs are non-trivial and are not correlated with variable costs and most importantly bilateral distance. They pose barriers to market access because they influence the costs that firms have to incur both home and abroad in order to serve foreign markets. For sensitivity analysis, we also use the additive values of the procedures to register a property for the exporter and importer as a measure of fixed cost. These data are obtained from the World Development Indicators (WDI, 2011).

2.3.3 Other Covariates

As conventional in gravity models, we add other variables that influence market access and trade volume. Unless otherwise stated, the rest of the data are obtained from Head et al. (2010) CEPII bilateral trade database. Common border is a binary variable equal to 1 when the two countries share a similar border and 0 otherwise. It captures the effect of contiguity on trade volume and market access. Legal origin is a dummy variable defined as 0 when the two countries have dissimilar legal systems and 1 when they have similar legal origin. In effect, it captures the effect of legal similarities on trade volume and partnership. To capture the effects of communication barriers and colonial linkages on trade volume and partnership, we use common language and common colonizer variables that equals to 1 when the two countries respectively have linguistic or colonial ties and 0 otherwise. Finally regional trade agreement (RTA) is

a dummy variable defined as 1 when the two countries belong to the same regional trade agreement and 0 otherwise. It measures the effect of regional trade agreements on bilateral trade volume and partnership.

2.3.4 Summary of North and South Classification and Trade Costs

For the purpose of our empirical analysis, we first rank the countries in our dataset based on income per capita and divide the sample into two (we later experiment with other definitions of South and North). The median income in our sample is $8977. Countries with income per capita from the median upwards are classified as North otherwise they are considered as South. Since our primary interest is in comparing the effect of trade costs on market access and export volume for South against North, we consider exporting to the same destination market. We generate a binary variable equal to 1 when South is exporting to North and zero otherwise. Table 2.1 reports the composition of countries in North and South together with their average GDP per capita. The average income for North is $25,179 and that for South is $3,428. Sub-Saharan Africa forms the highest share of South exporters (0.38) followed by countries in the Western Hemisphere (0.25) and Asia (0.22). For North, countries in Europe forms the highest share (0.52) followed by the Western Hemisphere (0.16) and the countries of Middle East and North Africa (0.14). The list of South and North countries are presented in Table 2.8. Table 2.2 shows the summary statistics of the dat used to construct our trade cost measures. The average bilateral distance for S-N is 7872km and for N-N is 6705km. The average cost of export and import per container is $955 and $1025 respectively for North and that of South is $1260 and $1511 respectively. The average number of procedures to register a property in the North are 6 and 10 for North and South respectively. This can possibly be explained by the monetary and security incentives to inspect imported cargo for taxes, tariffs and contraband materials.

Using the data for all 127 countries in our sample, Figure 2.1 plots the log of export costs against the log of GDP per capita. We observe an inverse relationship between a country's development stage and costs for exporting. High income countries such as Finland (FIN), Norway (NOR), and Singapore (SGP) are clustered at the lower right corners, whereas low income countries such as Central African Republic (CAF), Rwanda (RWA), and Niger (NER) are clustered at the upper left corners. The data suggest that South appears to face higher trade cost relative to North. Figure 3.1 shows a similar negative relationship between the cost of business start-up and GDP per capita. In the next section examine whether the effects of these costs on market access and export volume are quantitatively different for South and North.

2.4 Empirical Results

2.4.1 Aggregate Results: Export Markets and Export Volume

This section presents our first and second stage estimation results for our total sample. Column (1) of Table 2.3 presents the first-stage (extensive margin) estimates from the linear probability model of the effect of trade costs on the probability of success in entering export markets, augmented by the various control variables presented in section 2.3. We observe negative coefficients on our measures of trade costs: distance, variable cost and the cost of business startup. These coefficients are statistical significance at 1 percent. Hence the probability that a firm will successfully enter an export market is decreasing with rising variable cost, business start-up cost and distance. A 1 percent increase in distance decreases the probability that country j would import from i by about 0.12 percent. For variable cost, the decrease is by about 0.16 percent and 0.03 percent for fixed cost as measured by the cost of business startup.

However there is an added cost when a South country is exporting to a North market. When trade cost measures are interacted with a South-North dummy, all coefficients are

negative and statistically significant at 1 percent. When distance is interacted with a SN dummy, the coefficient on the interaction term is -0.011. This means that when a South country is entering an export market in North, the probability of success decreases by 0.01 percent. The total effect of distance therefore becomes $-0.120 - 0.011 = -0.131$. For variable and fixed costs of export, the probability of successful entry into an export market for South-North decreases by 0.002 and 0.007 respectively. For the other covariates, we observe positive coefficients that are significant at 1 percent. The probability of successful entry into export market increases when the two countries have a common legal system, share a common border, have had a colonial relationship, have similar linguistic ties and belong to the same regional trade agreement.

Turning to our second stage estimation, column (2) presents the second stage results (intensive margin). The coefficients represent the effect of trade costs on export volume (the intensive margin). Since we exclude the costs of business startup (fixed costs), we do not invoke any further exclusion restrictions as required by the two stage estimation framework.[5] Here, we pause to take note of the importance of unobserved firm heterogeneity on export volume. We observe a positive relationship between export volume and the fraction of firms that engage in export in the exporting country. A 1 percent increase in the fraction of exporters in the exporting country increases export volume by about 3 percent. Hence trade volume increase as the percentage of firms that export increases.

At the extensive margin, distance and variable cost have a negative effect of export volume. A 1 percent increase in distance decreases export volume by 1.5 percent. We also observe a negative correlation between variable cost and export volume. A 1 percent increase in variable cost decreases export volume by 0.28 percent. The coefficients on distance and variable cost are both significant at the 1 percent level. For the other explanatory variables, trade volume between ij increases when both countries belong

[5]Firms incur fixed cost when they decide to enter the export market in the first stage. After successful entry, only variable costs and distance matters.

to the same regional trade agreement, when they share a similar border, have had a colonial relationship in the past, have the same legal system, and have linguistic similarities. All the covariates are significant at 1 percent.

Finally, the coefficients on the interaction terms are negative but not significant for variable cost. When South is exporting to North, the negative effect of distance is -0.282. This indicates that a 1 percent increase in distance decreases the export volume when a South exporter is exporting to a North market. Again, the combined effect of distance is $-1.478 - 0.282 = -1.76$. For variable cost, trade volume decreases by 0.4 percent when South exports to North for a 1 percent increase in distance although the coefficient is not statistically significant. When South North dummies are interacted with the variable cost of export, we obtain a negative and statistically significant effect on the interaction term. When South is exporting to North, trade cost increases by about 0.4 percent. This suggests that at the extensive margin, South exporters face higher variable cost relative to North exporters. Next we turn to the estimation results for the product level.

2.4.2 First Stage Product Level Results: Extensive Margin

We repeat our first stage estimation by exploiting variation across products. Again, the coefficients measure the effect of trade cost on market access. The estimation is performed product by product, controlling for importer and exporter fixed effects and including the standard controls with robust standard errors clustered around country pairs. Since we have regression results for 144 products, we report the summary statistics for the variables of interest only. The results are presented in Table 2.4. Column (1) presents the median trade costs coefficients for all 144 product level estimations. Column (2) presents the standard deviation, and Columns (3) and (4) report the maximum and minimum coefficients respectively. Column (5) reports the number of coefficients that match our expected signs (negative for all measures of trade cost) and column 6

shows the fraction of correctly matched signs (-) that are statistically significant at 5 percent.

The median elasticity for distance is -0.135 whereas the maximum is 0.025 and the minimum is -0.054. All 144 coefficients on distance have the expected signs and are significant at least at the 5 percent level. Hence distance overall has a negative effect on the probability of success for firm's export. Interacting distance with a S-N dummy, the magnitude of the median coefficient is positive (0.009). However, only 47 of the entire 144 estimates have interaction terms for distance and S-N dummy that are negative. Of this 47 negative coefficients, only 6 are significant at 5 percent level. Therefore it appears that there is no statistically significant difference in the effect of distance on export volume when South is exporting to North. Considering the coefficients for variable cost, the median is -0.166, suggesting an overall negative effect of variable cost on trade partnership. When variable cost is interacted with SN dummies, the median coefficient is -0.011 with more than half of the estimates (89) having negative coefficients of which 47 reaches conventional statistical significance. The total effect of the variable cost on export volume is therefore $(-0.166 - 0.011) = -0.177$. Finally, fixed cost also has a negative effect on the extensive margin of export, with 134 estimates having the expected sign for the fixed cost variable (business cost) of which 105 are significant at 5 percent. The estimated median coefficient when the fixed cost is interacted with SN dummy is -0.010 of which 99 with 62 being significant at 5 percent. Overall at the product level, we observe negative coefficients on the interaction terms, although the number of coefficients that are correctly signed and significant is not very substantial (6 for distance, 47 for variable cost and 62 for business start-up cost.)

2.4.3 Second Stage Product Level Results: Export Volume

We next perform our second stage estimation using commodity level data and control for the fraction of exporters and sample selection bias as in our second stage

aggregate model. The results are presented in table 3.6. As already noted, Columns (3) and (4) report the maximum and minimum coefficients respectively and column (2) shows the standard deviations. Column (5) reports the number of coefficients that match our expected signs (negative for all measures of trade cost) and Column (6) shows the fraction of correctly matched signs (-) that are statistically significant at 5 percent. The coefficients on distance are negative and statistically significant for all estimates. The median coefficient of distance is -1.863. Hence at the extensive margin, distance has a negative effect on export volume. The coefficients on the interaction term between distance and SN dummies, are generally positive. Only 19 of the estimated results have coefficients that are negative of which 2 are significant at 5 percent. For the variable cost, the median coefficient is -0.67 of which 98 are negative with 36 being statistically significant. Thus, overall, the higher the variable cost of export between ij, the lower the export volume. Finally the interaction term between variable cost and SN dummies have a median coefficient of -0.421 of which 136 are negatively signed with 91 of the rightly signed coefficient being significant at 5 percent. The total effect of variable cost on export volume is $(-0.670 - 0.421) = -1.091$ at the intensive margin. Hence the effect of variable cost on export volume for South-North appears to be higher at the extensive margin.

2.5 Sensitivity Checks

To verify if the results obtained above are robust, we perform a second set of regressions that use the sum of the number of procedures to register a property for the exporter and importer respectively as a measure of fixed cost. The results are reported in columns (3) and (4) of Table 2.3. Column (3) shows the results for the effect of trade costs on market access (extensive margin). We observe similar results as in column (1). The probability of market access success is decreasing with distance, fixed cost and variable cost. Most importantly, the probability that country i import

from j decreases by 0.015 precent for a 1 percent increase in variable cost. Further, when the fixed cost variable is interacted with the SN dummy, the coefficient indicates that the negative effect of fixed cost on market access increases by -0.015 percent when a South country is exporting to a North partner. Column (4) shows the second stage estimation results of the effect of trade cost on trade volume (intensive margin). Again the results are not very different although the coefficients are slightly higher than in the previous estimates in column (2). Trade volume is decreasing with increasing distance, variable cost, and fixed costs. The coefficient on the interaction term between the variable cost and SN dummy is negative but not statistically significant. The results confirm that at the aggregate level, trade costs have a negative effect on market access and export volume for South.

Tables 3.5 and 3.7 show results for the second stage estimation. The estimation results obtained are not quite different from those that uses business startup cost as a measure of fixed cost. In table 6 the results for the extensive margin are presented with summary statistics for the trade cost variables of interest. The median coefficient on the variable cost is -0.004 of which 71 are negatively signed with 42 of them being statistically significant. Interacting the average number of procedures to register a property with SN dummy, the median coefficient suggest that overall, the probability of market access success decreases by about 0.02 percent, when a South exporter is exporting to a North market. In Table 3.7 the results of the effect of distance and variable cost on the intensive margin shows that there is no significant difference in the effect of distance on market access when South export's to North. However the interaction term on the variable cost suggest that for South-North trade, export volume decreases by about 0.43 percent for a 1 percent increase in variable cost.

Finally for further sensitivity checks, we estimate another set of regression results by dividing the entire dataset into a pooled sample, North-North (N-N) and South-North (S-N), and compare the absolute magnitudes on the coefficients on distance, variable costs and fixed costs for N-N and S-N. We also perform another set of estimation by

redefining South countries to include those countries with income per capita below the 25 percentiles ($1,031) and North to include countries with income per capita above the 75th percentile ($16,780). While the results are not reported, they are available upon request. In all cases, while there are slight variations in estimation results, the general pattern discussed in the data above remains representative.

2.6 Conclusion

Recent interest in international trade has focused on the effects of trade frictions on the extensive and intensive margins of export. In this paper we present empirical evidence on the effects of variable and fixed costs of export on the extensive and intensive margins of trade for South vs. North exporters. In particular, we search for the presence of any systematic development related bias, where South exporters face higher market access friction relative to North exporters. At the extensive margin, when we interact trade costs with South-North dummies and compare the effects of observable fixed and variable costs on the probability of success in entering export markets, only 33% of the commodities under consideration have negative signs that are significant at 5% for variable cost (shipping cost). For fixed cost (Business cost), 43% of the 144 commodities have have coefficients that are negative and 5% significant level as seen in Table 2.4. Hence, while both fixed and variable costs matter for successful entry into export markets, the South vs. North bias in trade costs is not quite substantial at the extensive margin. At the intensive margin, where we examine the effect of observable variable cost on the export volume of South exporters who successfully penetrate export market, we do not find any significant South North bias when variable costs are interacted with South-North dummies.

2.7 Tables and Figures

Table 2.1: Income and Regional Composition of North and South

	South	North
Average GDP per Capita ($)	3428	25179
Share of Sub-Saharan Africa	0.38	0.06
Share of Western Hemisphere	0.25	0.16
Share of Asia	0.22	0.11
Share of Europe	0.03	0.52
Share of Middle East and North Africa	0.11	0.14

Table 2.2: Summary Statistics of Trade Cost Measures

	North			
Variable	Mean	Std. Dev.	Min	Max
Cost of Export per Container ($)	954	422	416	2730
Cost of Import per Container ($)	1052	453	367	2780
Cost of Business Startup (% of GNI per Capita)	12	15	0	91
Procedures to Register Property	6	3	1	14
North -North Bilateral Distance (Km)	6705	4660	132	19564
	South			
Variable	Mean	Std. Dev.	Min	Max
Cost of Export per Container ($)	1260	738	390	4581
Cost of Import per Container ($)	1512	853	430	4534
Cost of Business Startup (% of GNI per Capita)	184	791	6	6376
Procedures to Register Property	10	3	5	17
South-North Bilateral Distance (Km)	7872	3968	115	19650

Table 2.3: Aggregate Results: Effect of Trade Costs on Market Access and Trade Flows

	Extensive Margin	Intensive Margin	Extensive Margin	Intensive Margin
	(1)	(2)	(3)	(4)
Distance	-0.120***	-1.478***	-0.121***	-1.566***
	(0.003)	(0.047)	(0.003)	(0.049)
Distance * SN	-0.011***	-0.282***	-0.011***	-0.287**
	(0.004)	(0.037)	(0.004)	(0.037)
Variable Cost	-0.160***	-0.352	-0.160***	-0.467
	(0.022)	(0.300)	(0.023)	(0.298)
Variable Cost *SN	-0.016***	-0.367***	-0.015**	-0.382***
	(0.005)	(0.044)	(0.006)	(0.044)
Business Startup Cost	-0.032***			
	(0.003)			
Business Startup Cost * SN	-0.007***			
	(0.003)			
Procedures to Trade			-0.037***	
			(0.013)	
Procedures to Trade to Trade * SN			-0.015*	
			(0.009)	
Regional Trade Agreements	0.067***	0.498***	0.068***	0.537***
	(0.005)	(0.055)	(0.006)	(0.055)
Common Legal System	0.023***	0.355***	0.025***	0.379***
	(0.003)	(0.029)	(0.003)	(0.029)
Colonial Relations	0.028***	0.505***	0.028***	0.513***
	(0.005)	(0.067)	(0.005)	(0.067)
Common Border	0.050***	1.064***	0.048***	1.106***
	(0.014)	(0.101)	(0.014)	(0.101)
Common Language	0.077***	0.788***	0.076***	0.853***
	(0.005)	(0.053)	(0.005)	(0.052)
$\hat{w}^*_{ij}$		0.904***		0.815***
		(0.090)		(0.086)
$\beta_{uv}\hat{\eta}^*_{ij}$		2.749***		3.035***
		(0.133)		(0.134)
Observations	2,304,288	631,285	2,304,288	632,118
R-squared	0.468	0.357	0.468	0.359

Note: Regressions (1) and (2) use the additive values of the cost of business startup for exporter and importer as a measure of fixed cost of trade. Regression (3) and (4) use the additive values of the procedures to register a property the exporter and importer respectively as a measure of fixed cost of export. Exporter and importer fixed effects are not reported. Robust standard errors clustered around country pairs are in parenthesis. *, ** and *** indicates significance at 10%, 5% and 1% respectively.

Table 2.4: Summary of LPM Coefficients Using 144 Products for 2006

Coefficient	Median	St. Dev.	Max	Min	Sign match(-)	match & 5% Sig.
	(1)	(2)	(3)	(4)	(5)	(6)
Distance	-0.135	0.025	-0.054	-0.190	144	144
Distance * SN Dummy	0.009	0.020	0.069	-0.031	47	6
Shipping Cost	-0.166	0.075	0.057	-0.314	140	111
Shipping Cost * SN Dummy	-0.011	0.027	0.051	-0.090	89	47
Business Cost	-0.028	0.019	0.020	-0.074	134	105
Business Cost Cost * SN Dummy	-0.010	0.015	0.027	-0.042	99	62

Note: The regressions use OLS estimation, we run 144 regressions for each commodity with robust standard errors that are clustered around country pairs. All other covariates are not reported. They include exporter and importer fixed effects, regional trade agreements, common legal system, colonial relations, common border, common language.

Table 2.5: Summary of OLS Coefficients Using 144 Products for 2006

Coefficient	Median	St. Dev.	Max	Min	Sign match(-)	match & 5% Sig.
	(1)	(2)	(3)	(4)	(5)	(6)
Distance	-1.863	0.497	-0.341	-2.973	144	144
Distance * SN Dummy	0.288	0.281	0.857	-1.141	19	2
Shipping Cost	-0.670	1.524	3.248	-4.894	98	36
Shipping Cost * SN Dummy	-0.421	0.300	1.074	-1.108	132	91

Note: The regressions use OLS estimation, we run 144 regressions for each commodity with robust standard errors that are clustered around country pairs. All other covariates are not reported. They include exporter and importer fixed effects, regional trade agreements, common legal system, colonial relations, common border, common language and controls for firm heterogeneity and sample selection bias as in the aggregate estimation.

Table 2.6: Summary of LPM Coefficients Using 144 Products for 2006

Coefficient	Median	St. Dev.	Max	Min	Sign match(-)	match & 5% Sig.
	(1)	(2)	(3)	(4)	(5)	(6)
Distance	-0.136	0.0246	-0.055	-0.192	144	144
Distance * SN Dummy	0.0085	0.02	0.07	-0.032	50	7
Variable Cost	-0.182	0.093	0.087	-0.344	137	107
Variable Cost * SN Dummy	-0.0105	0.042	0.11	-0.138	81	36
Procedures to Trade	-0.0045	0.126	0.313	-0.334	71	42
Procedures to Trade * SN Dummy	-0.023	0.05	0.126	-0.166	95	47

Note: The regressions use OLS estimation, we run 144 regressions for each commodity with robust standard errors that are clustered around country pairs. All other covariates are not reported. They include exporter and importer fixed effects, regional trade agreements, common legal system, colonial relations, common border, common language.

Table 2.7: Summary of OLS Coefficients Using 144 Products for 2006

Coefficient	Median	St. Dev.	Max	Min	Sign match(-)	match & 5% Sig.
	(1)	(2)	(3)	(4)	(5)	(6)
Distance	-2.055	0.557	-0.199	-3.246	144	143
Distance * SN Dummy	0.300	0.288	0.846	-1.157	19	3
Variable Cost	-0.8915	1.507	3.048	-4.333	105	41
Variable Cost * SN Dummy	-0.429	0.305	1.099	-1.087	132	93

Note: The regressions use OLS estimation, we run 144 regressions for each commodity with robust standard errors that are clustered around country pairs. All other covariates are not reported. They include exporter and importer fixed effects, regional trade agreements, common legal system, colonial relations, common border, common language and controls for firm heterogeneity and sample selection bias as in the aggregate estimation.

Table 2.8: List of North and South Countries

North		**South**	
Argentina (ARG)	Latvia (LVA)	Albania (ALB)	Kenya (KEN)
Australia (AUS)	Lebanon (LBN)	Algeria (DZA)	Madagascar (MDG)
Austria (AUT)	Lithuania (LTU)	Bangladesh (BDG)	Malawi (MWI)
Bahamas (BHS)	Luxembourg (LUX)	Belize (BLZ)	Maldives (MDV)
Bahrain (BHR)	Malaysia (MYS)	Bhutan (BTN)	Mali (MLI)
Belarus (BLR)	Mauritius (MUS)	Bolivia (BOL)	Mauritania (MRT)
Belgium (BEL)	Mexico (MEX)	Brazil (BRA)	Mongolia (MNG)
Botswana (BWA)	Netherlands (NLD)	Burkina Faso (BFA)	Morocco (MAR)
Bulgaria (BGR)	New Zealand (NZL)	Cambodia (KHM)	Mozambique (MOZ)
Canada (CAN)	Norway (NOR)	Cameroon (CMR)	Namibia (NAM)
Chile (CHL)	Oman (OMN)	Central African Rep. (CAF)	Nicaragua (NIC)
Hong Kong (HKG)	Panama (PAN)	China (CHN)	Niger (NER)
Costa Rica (CRI)	Poland (POL)	Colombia (COL)	Nigeria (NGA)
Croatia (HRV)	Portugal (PRT)	Comoros (COM)	Pakistan (PAK)
Cyprus (CYP)	Qatar (QAT)	Cote d'Ivoire (CIV)	Paraguay (PRY)
Czech Rep. (CZE)	Rep. of Korea (KOR)	Dominica (DMA)	Peru (PER)
Denmark (DNK)	Romania (ROM)	Dominican Rep. (DOM)	Philippines (PHL)
Estonia (EST)	Russian Federation (RUS)	Ecuador (ECU)	Rwanda (RWA)
Finland (FIN)	Saudi Arabia (SAU)	Egypt, Arab Rep. (EGY)	Senegal (SEN)
France (FRA)	Singapore (SGP)	El Salvador (SLV)	Sri Lanka (LKA)
Gabon (GAB)	Slovakia (SVK)	Ethiopia (ETH)	Sudan (SDN)
Germany (DEU)	Slovenia (SVN)	Fiji (FJI)	Suriname (SUR)
Greece (GRC)	South Africa (ZAF)	Gambia (GMB)	Syria (SYR)
Hungary (HUN)	Spain (ESP)	Ghana (GHA)	Thailand (THA)
Iceland (ISL)	Sweden (SWE)	Guatemala (GTM)	Tunisia (TUN)
Ireland (IRL)	Switzerland (CHE)	Guinea (GIN)	Ukraine (UKR)
Israel (ISR)	Trinidad and Tobago (TTO)	Guyana (GUY)	Tanzania (TZA)
Italy (ITA)	Turkey (TUR)	Honduras (HND)	Viet Nam (VNM)
Japan (JPN)	United Arab Emirates (ARE)	India (IND)	Yemen (YEM)
Kazakhstan (KAZ)	United Kingdom (GBR)	Indonesia (IDN)	Zambia (ZMB)
Kuwait (KWT)	Uruguay (URY)	Jamaica (JAM)	Zimbabwe (ZWE)
Venezuela (VEN)	United States (USA)	Jordan (JOR)	

Figure 2.1: Export Cost and Income

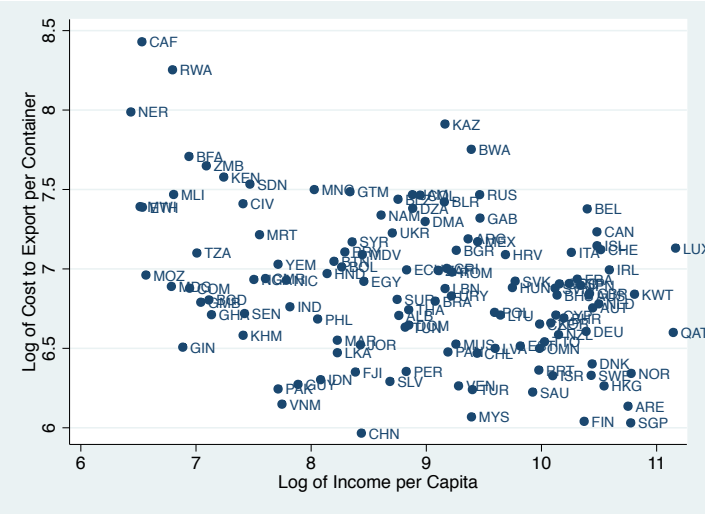
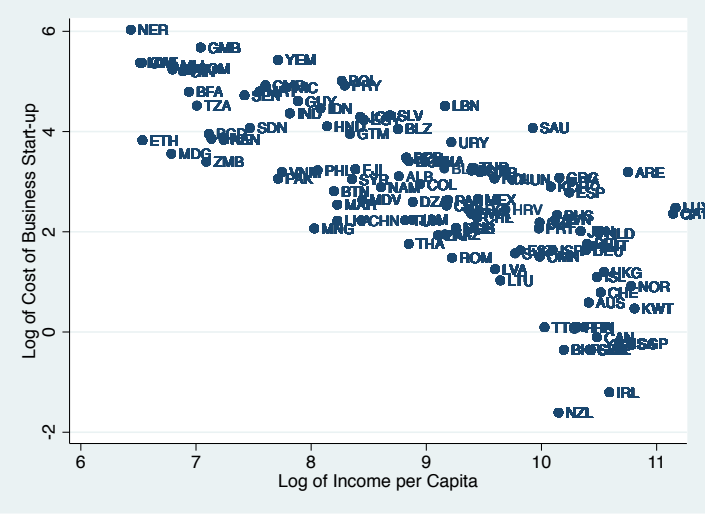


Figure 2.2: Business Start-up Cost and Income



Chapter 3

Do South Migrants Attract North's FDI?

3.1 Introduction

Data on international migration patterns for the second half of the twentieth century shows some interesting trends. Of the third of the world's population living in foreign countries, South-North migration is the fastest growing both in absolute terms, and relative to North-North, North-South, and South-South migration. Figure 3.1 shows the movement of South-South, South-North, North-North and North-South migrants from 1970 to 2000. As at the year 2000, South-North movements accounted for 37 percent of all international migration. While this surge in South-North migration is generally attributed to falling transport and communication costs as well as the prospects of higher expected wages in the developed world, their consequences on the origin and destination countries continue to intrigue both researchers and policy makers especially in the developing world. Among the themes that have gained increasing attention include remittances (Ratha and Shaw, 2010), brain drain in the countries of origin (Bhargava and Docquier, 2008), gender and age of entry (Beine et al., 2007) and the implications of migration on the labor market conditions in the destination countries (Friedberg and

Hunt, 1995; Borjas, 2003).

However other feedback mechanisms that arise as a result of South-North migration networks have received little attention. One such mechanism is the relationship between migration and FDI. As South-North migration has increased over the years, North-South FDI has also increased tremendously. Figure 2.1 shows the flow of FDI from 30 OECD countries to 101 developing countries used in this study. Between 2000 and 2007 North-South FDI more than doubled. When the increase in South-North migration is coupled with recent realization that North-South FDI has also grown substantially, one is likely to expect some bilateral forces at work, but only a handful of researchers have investigated migration networks and FDI. The existing empirical evidence is so far limited to country case studies including the United States (Javorcik et al., 2011; Bhattacharya and Groznik, 2008; Kugler and Rapoport, 2005) and Germany (Buch et al., 2006). The limitation is that it is difficult to draw conclusions that are applicable across countries. Moreover while the United States is undoubtedly the most dominant destination for migrants from all over the world, it will be interesting to investigate if the derived conclusions from these country case studies are applicable in a cross-country bilateral framework. However such works are so far impeded by the lack of South-North bilateral migration data that corresponds to available bilateral FDI data.

Using bilateral migration data on foreign-born citizens in a sample of 22 OECD countries for the year 2000, and FDI from those countries to 109 developing countries, this paper investigates the feedback mechanism between South-North migrants and North-South FDI. It extends the previous country case studies on FDI and migration to a bilateral cross-country framework. It also analyzes the effect of migration on FDI in the face of higher startup cost of business in the migrant's home country. The paper therefore contributes to the study on a less explored channel through which international migration benefits both the origin and the destination country through migrants who help bridge the information gap between foreign investors and the corporate environment in their countries' of origin.

The investment environment in most developing countries is riddled with market imperfections that make it difficult for foreign investors to acquire the information that is required to make investment decisions. Firms therefore spend substantial amounts of resources trying to understand the corporate culture, local market conditions, distribution networks, and the political landscape in these countries. South migrants who have a better understanding of the business climate in their countries of origin may prove valuable in filling this knowledge gap when they assimilate in the business environment in the North. They understand how the formal and informal sectors coexist, preferences of local individuals, corporate and labor laws, distributive channels, and current or future government policies that can affect investors. They may also have inside political knowledge, information about tax systems, local demand or help firms source for cheap input and intermediate products. By transferring such knowledge, there is a feedback mechanism in which South migrants provide information to foreign firms about investment and profit opportunities that may attract FDI to the migrants' countries of origin. When multinationals use this knowledge in making investment decisions about developing countries, transaction costs can be lowered, increasing the volume of FDI outflow from North to South. However, when start-up costs of investment in the South is higher, the benefit of the information provided by South migrants to North investors would be low, since the initial cost of entry would still discourage foreign investors from entering the local market in the South. Hence in the presence of higher start-up, the expected positive effect of migration on FDI inflow would be low. South-North migration should therefore have a positive association with North-South bilateral FDI stock with the positive association being stronger in the face of lower initial business start-up cost.

The results suggest that South migrants that relocate in North play a positive role in attracting FDI from North to South. This positive association is stronger when the stock of skilled migrants is high. However, I do not find any strong evidence that higher start-up costs reduce the positive effect of South-North migration on North-

South FDI. Hence, aside remittances, South migrants bring benefit to their countries' of origin through information channels that attract investment from North to South.

This paper relates to several bodies of literature that examine why so little capital flows from rich to poor countries. In a seminal paper, Lucas (1990) asks that if marginal returns to capital are highest in capital scarce countries, why is there too little capital flow from developed to developing countries? This phenomenon, often termed the "Lucas paradox", has received several important responses. Among them are the institutional quality argument (Alfaro et al., 2008) and the credit reputation of countries (Eaton and Gersovitz, 1981). Examining the role of different factors behind the the lack of capital flows from rich to poor countries. Alfaro et al. (2008) argue that differences in institutional quality between rich and poor countries is the main reason behind the "lucas paradox" between the period 1970-2000. Hence, corrective policies such as protection of private property and political stability in poor countries can increase the flow of investment funds from rich to poor countries. Eaton and Gersovitz (1981) present a theoritical and empirical model that show that in the international private capital market, poor country debt and the possiblity of default or bankruptcy are the reasons behind why international lenders provide too little capital to governments of developing countries. Gordon and Bovenberg (1996) emphasize that one convincing explanation is information asymmetry and market imperfections. They argue that investors may have a poor knowledge of the domestic market conditions in a foreign country and may be overcharge in their attempt to acquire assets in another country by domestic individuals. Portes et al. (2001) also emphasize the importance of information for capital flows. They argue that information asymmetry accounts for the strong negative relationship between asset trade and distance especially in the case of foreigners decision to acquire physical assets in another country.[1]

[1] However with recent surge in FDI from North to South in the past decades, there is a growing interest in the linkages fostering FDI outflow from North to South, explanations include improvement in institutions (Busse and Hefeker, 2007; Asiedu, 2006), financial market developments (Ang, 2009; Hermes and Lensink, 2003) and human capital development (Noorbakhsh et al., 2001).

This paper also relates to the literature on the network effects between migrants abroad and FDI attraction into the migrants' home country. In a recent paper, Javorcik et al. (2011) investigate the relationship between migrants in the United States and US FDI in the migrants' countries of origin. They find that US foreign direct investment sales abroad is positively associated with migrants' presence from the host country. Further the linkages are stronger when the share of tertiary migrants is large.[2] Using German state level data Buch et al. (2006) find that FDI flows into German states hosting large foreign national from the same country as the FDI. Kugler and Rapoport (2005) find similar evidence of dynamic complementarity and contemporaneous substitutability between FDI and migrations.[3]

The rest of the paper is organized as follows; section 2 describes the dataset used in the study, section 3 presents the empirical model; section 4 presents the estimation results and interpretation and section 5 concludes

3.2 The Data

The data base for the paper is a cross section of developed and developing countries in two years, 2000 and 2005. The set of countries are listed in Tables 3.5 and 3.6. The dependent variable of interest is the total stock of FDI outflow from North country i to South country j measured in United States dollars. I use data for the year 2000 and 20005. This data is obtained from the OECD Statistics Portal. South-North migration is measured as the total stock of foreign-born migrants from South country j

[2]Bhattacharya and Groznik (2008) also investigate the relationship between US direct and indirect investment abroad and migrants' income. For immigrants groups from any particular country, the higher their income, the higher is US foreign investment in that country.

[3]Many empirical works have also documented such linkages between bilateral trade volume and migration networks. For instance Herander and Saavedra (2005) examine the relationship between state populations of immigrant groups and the volume of state exports to the home country of the immigrant group and find that migration increases exports to migrants home country. Further the effect is stronger for newer immigrant groups. Rauch and Trindade (2002) find that ethnic Chinese networks increases bilateral trade in differentiated goods. Head and Ries (1998) found that Canadian bilateral trade has a positive association with bilateral migration. Gould (1994) found that US export is positively influenced by immigration patterns.

residing in North country i. This dataset is obtained from the World Bank Development Indicators 2012 (WDI 2012). I also use the total stock of foreign-born skilled migrants from South country j residing in North country i, which is obtained from the database on immigrants in OECD and non-OECD countries(DIOC-E). All migration data are for the year 2000.

Following recent literature on the determinants of FDI, I include a set of control variables that are either country pair specific or specific to the South country. From the WDI 2012 data base, I use population size measured as the total population of the host country to weight the migration variables. GDP per capita measured in 2005 dollars captures the market size of the host country. Consistent with the horizontal motive for FDI, large market size attracts more FDI to the host country. Inflation, measured as the change in the consumer price index is used as a proxy to capture the stability of the macroeconomic environment in the host country. Sound macroeconomic foundation creates investment opportunities that attract foreign investors, and consequently more FDI. Business start-up costs as a percentage of gross national income, captures the cost of the procedures required to start a business in the migrants' home countries'. Higher costs of business start-up raises the initial capital required to start investment in the South which discourages FDI. In all regressions, the start-up cost data is for the year 2005, which is the earliest year for which data is available. To capture the effect of institutional quality on FDI, I use the strength of legal system, which is an index ranging from 1 to 10 with 10 indicating highest level of legal strength that measures the strength of a countries legal institutions in the protection of private property and enforcing contracts.

From the CEPII database, I use common official language, which is a binary variable equal to 1 when the two countries share a similar language and 0 otherwise to capture the effect of linguistic ties on FDI outflow from North to South. Sharing a similar language reduces communication and information barriers which makes cross border investment easier. Distance measured in kilometers captures the cost of moving capital

from North country i to South country j. The longer the distance, the less likely is it that investors would move capital overseas. On, the other hand, to avoid transport cost, it is also possible that firms would prefer to invest in a country the farther away that country is from the investors' home country. Hence the coefficient on distance could be either positive or negative. Summary statistics concerning the key variables is reported in table 3.7. Market size, distance, FDI, legal strength and migration enter the regression in log form, whereas inflation, business start-up costs, linguistic ties, and colonial relations enter in levels.

3.3 Statistical Estimation

This paper investigates the role of foreign-born South migrants in attracting FDI from North to South. South migrants may serve as nodes through which information on the investment climate in the South is transferred to North investors. The estimation model is assumed to be of the form:

$$log(FDI_{ij}) = \gamma_1 log(Mig_{ji}) + \Gamma' X_{ij} + \gamma_i + \gamma_j + \epsilon_{ij} \tag{3.1}$$

where FDI_{ij} is the total stock of FDI outflow from North country i to South country j; Mig_{ji} is the stock of foreign-born migrants from j residing in i. Depending on the specification, I use different measures of migration. The first is the total stock of foreign-born migrants from j residing in i. The second is the total stock of foreign-born skilled migrants(migrants with at least a tertiary education) from j residing in i, and finally, the stock of total foreign-born migrants and the total skilled migrants weighted by the total population of the migrants' countries of origin; X is a vector of control variables other than migration that are either bilateral or specific to the South country. They include the host country's start-up costs, market size, strength of the legal system, inflation rate, the bilateral distance between North country i and South

country j and the colonial relations existing between i and j. γ_i and γ_j are North and South fixed effects respectively, ϵ_{ij} is an iid error term, and β, γ, and Γ are parameters.

I estimate a variation of the basic specification which allows the effect of migration on FDI to depend on the start-up costs of establishing a business in the migrant's home country. The objective is to test the hypothesis that, in the face of higher start-up costs, the positive association between South-North migration and North-South FDI outflow is small. The corresponding variation of the model is of the following form:

$$log(FDI_{ij}) = \gamma_1 log(Mig_{ji}) + \gamma_2 log(Mig_{ji}) * (StartupCost_j) + \Gamma' X_{ij} + \gamma_i + \gamma_j + \epsilon_{ij}. \quad (3.2)$$

Notice that the business start-up costs is measured as a percentage of gross national income. By allowing migration to interact with the start-up costs of business in the South, the partial effect of migration on FDI attraction can be expressed as follows:

$$\frac{\Delta log(FDI)}{\Delta log(Mig)} = \gamma_1 + \gamma_2 StartupCost_j \quad (3.3)$$

As South migrants residing in North increase, FDI from North to South is expected to rise, and, γ_1 consequently becomes positive. If start-up costs of investment have a negative effect on FDI as expected, then γ_2 is negative, hence as start-up costs decrease, the positive effect of foreign-born migrants on North's FDI to South becomes stronger. In the next section, these models are tested with the data. All estimations are performed by Ordinary Least Squares.

3.4 Empirical Results

3.4.1 Total Foreign-Born Migrants, Start-up Costs and FDI

Table 3.1 present the initial OLS results using the total stock of foreign born migrants as the measure of South-North migration. All regressions include North and

South dummies that capture country specific factors that may influence FDI but are not captured by the explanatory variables in the model. The dependent variable is the total stock of FDI from North country i to South country j for the year 2000 expressed in logs. Hence, the results examine the contemporaneous effect of South-North migration on North-South FDI. Column (1) presents the basic specification. The coefficient on the total migrant stock is positive but statistically insignificant. A percent increase in South-North foreign-born population increases North-South FDI by 0.1 percent. Start-up costs also have the expected sign. A 1 percent increase in the cost of business start-up in the South, decreases North-South FDI by 0.1 percent (start-up costs enter the equation in levels). The coefficient is significant at 5% significant level. All the other covariates have the expected signs, North-South FDI is increasing in South's market size, strength of legal system, past colonial relations and when the two countries share a similar language. Distance has a negative and statistically significant effect on FDI outflow to South, a 1 percent increase in distance decreases FDI by 1 percent. The coefficient is significant at 1% significance level. The inflation rate, which is purported to capture macroeconomic instability in the host country also has a negative effect on FDI, a 1 percent increase in inflation decreases North-South FDI by about 0.7 percent (inflation enter the equation in levels). The R-square suggests that about 88 percent of the variation in North-South FDI is explained by changes in the explanatory variables.

Column (2) presents the results of the model that includes the interaction term. Here, we observe a positive association between the total stock of South-North foreign-born migrants and North-South FDI outflow. A 1 percent increase in the stock of South migrants residing in North increases North-South FDI outflow by 0.1 percent, the coefficient is significant at the 5% significant level. The coefficient on the interaction term is not statistically different from zero. Hence, holding start-up costs constant, the partial effect of South-North migration on North-South FDI outflow is given as $0.143 - 0.000(StartupCosts)$ which is equal to 0.143, when evaluated at the mean of start-up costs. This suggests that the effect of migration on FDI is not influenced by

the cost of business start-up in the South. Even with the addition of the interaction variable, the coefficients on the other regressors are not significantly different from those obtained in column (1). Market size has a positive but statistically insignificant effect on FDI. South-North FDI is also increasing in with the strength of the Souths' legal system, the existence of colonial ties between North and South, and when the two countries have a similar language. The coefficient of distance is negative and statistically significant at 1%. A percentage increase in the bilateral distance, decreases North-South FDI by about 1 percent.

In column (3), the migration variable is weighted by total population. We do not observe any substantial change in the coefficient on migration when it is weighted by population, which again has a positive and statistically insignificant effect on FDI. The coefficients on start-up cost is negative and significant at 5%. The effects of the other covariates on FDI are not very different from that observed in column (1). In column (4), the model includes an interaction term for total migration (weighted by a country's total population) and the cost of business start-up. We observe a positive and statistically significant relationship between South-North migration and North-South FDI. A 1 percent increase in South-North migration increases North-South FDI by 0.2 percent. The coefficient on the interaction term is also not different from zero, suggesting that the effect of South migrants on FDI from North to South is not significantly influenced by start-up cost in the South.

3.4.2 Foreign-Born Skilled Migrants, Start-up Costs and FDI

In Table 3.2, I replace the total stock of foreign-born migrants from South, with the total stock of skilled migrants. The intuition is that skilled migrants are more educated, informed and are in a better position to transfer local knowledge to foreign investors, hence the magnitude of the coefficients on migration on FDI should be higher when skilled migrants are considered. Column (1) presents OLS results similar to that

of column (1) in Table 3.1. Here, we observe a positive and statistically significant effect of migration on FDI. A 1 percent increase in the stock of skilled migrants from South residents in North increases North's FDI to South by 0.2 percent. The coefficient is statistically significant at 1%. Start-up costs also have a negative and statistically significant effect on FDI. A 1 percent increase in start-up costs decreases FDI from North-South by about 0.8 percent. All the other covariates retain the same signs as in the previous estimates. Legal strength and colonial ties have positive and statistically significant effect on FDI, while bilateral distance and inflation have negative effects on FDI, while market size and linguistic ties have positive effects on FDI attraction, they do not reach conventional statistical significance.

Column (2) presents the estimation result that includes the interaction variable. Skilled migrants have a positive and statistically significant effect on FDI. A 1 percent change in the stock of skilled migrants increases FDI by about 0.3 percent. The start-up cost, while having the expected sign is not statistically significant. The coefficient on the interaction term made up of skilled foreign-born migrants and the start-up cost is statistically not different from zero. Hence we observe that the effect of migration on FDI is not strongly influenced by the cost of business start-up in the South. Consistent with previous results, distance, and inflation have negative and statistically significant effect. All thing equal, a 1 percent increase in inflation decreases FDI by about 8 percent. Colonial relations also has a positive effect on FDI. A 1 percent increase in colonial ties increases FDI by ($e^{1.358} - 1 = 2.691$) about 3 percent. The coefficient is significant at 1%. Columns (3) and (4) repeats the regressions in columns (1) and (2) using the the stock of skilled migrants weighted by population as a measure of migration. We do not observe and substantial change in the coefficients when skilled migrants are weighted by a country's total population. Most importantly, we observe that the coefficient on the interaction term is not quite different from zero, suggesting that the positive effect of skilled migrants on FDI is not strongly influenced by the start-up cost of business in the South. Also, all things equal, skilled migrants have a

positive and statistically significant effect on North-South FDI. A 1 percent increase in the skilled migrants from South residing in North increases FDI from North to South by 0.2 and 0.3 percents respectively.

Comparing the results in Tables 3.1 and 3.2 we observe that the coefficients of migration in Table 3.2 (ranging in values from 0.224 to 0.383) are higher than that of 3.1 (ranging in values from 0.098 to 0.177). Hence it appears that migrants that are highly educated attracts more FDI. However, in both tables, the coefficients on the interaction terms do not appear to be significantly different from zero, suggesting that the positive effect of migration (both skilled migrants and total migrants) do not depend on the start-up costs of business in the South country. All the estimation results maintain sufficient explanatory power with R-squares ranging from 0.874 to 0.885.

3.5 Robustness Results

When analyzing the contemporaneous relationship between migration and FDI, there can exist potential problems of endogeneity. FDI inflow creates new investment opportunities, transfer of knowledge, and new jobs that promote economic growth and limit the economic incentive to migrate. Parent firms may also send workers abroad to learn and acquire new skills or relocate them in their headquarters. To get around this potential problem, I use FDI outflows in 2005 as a dependent variable. Hence, I examine the effect of the total stock of foreign-born migrants from South residing in North in 2000 on North's FDI to South in 2005. While FDI in 2000 is more likely to be correlated with migration in 2000, migration in 2000 is less likely to be correlated with FDI in 2005. The results are discussed in Tables 3.3 and 3.4.

In Table 3.3, I use the total stock of foreign born migrants as in table 3.1 but uses the stock of FDI outflow from North to South in 2005. We observe a similar results for the effects of South-North migration on North-South FDI outflow. An increase in the stock of foreign born migrants from South to North increases FDI outflow from

North to South, with coefficients ranging from 0.169 to 0.210. Again, start-up costs have a negative effect on FDI, suggesting that, as the initial cost of investment in South increases, FDI inflow from North decreases. The interaction terms appear not to be significantly different from zero. Hence the effect of migration on FDI again is not significantly dependent on the cost of business start-up in the South. Another notable observation is the effects of market size on FDI. Compared to the previous estimates, market size has a positive and statistically significant effect on FDI. A 1 percent increase in the size of the local market in the South increases FDI from North by between 1.1 percent and 1.5 percent. Linguistic ties have no significant effect, whereas legal strength and colonial relations have a positive and statistically significant effects on FDI inflow. Overall the number of observations appear to be higher, but the explanatory power of the covariates as evident from the R-square values ranging from 0.836 to 0.839 remains consistent as in the previous estimates.

Finally, Table 3.4 presents the result using the stock of skilled migrants from South residing in North. Skilled migrants appear to have a positive effect on FDI inflow from North to South. All coefficients on skilled migrants remain statistically significant at the 1% significant level. In columns (2) and (4), the coefficients on the interaction terms are not significantly different from zero, suggesting that the results obtained in previous estimates are not arbitrary even when different measures of migration and FDI are used. North-South FDI is decreasing with bilateral distance and inflation and increasing with market size, colonial relations and the strength of the legal system in the South. In columns (3) and (4), where I use total skilled migrants weighted by population as a measure of migration, the coefficients on start-up cost while having the expected negative signs do not reach conventional statistical significance. Again, the regressions maintain significant explanatory power as evident from the R-square values.

3.6 Conclusion

In this paper, I present evidence on the role of foreign-born South migrants residing in North in attracting FDI from North to South. I test the hypothesis that higher stock of South migrants transfer knowledge about the investment climate in the South that may attract foreign investors from North to South. I also test the hypothesis that in the presence of higher start-up costs of business in the South, the effect of South-North migration on North-South FDI is smaller. I perform regression estimates using different measures of migration and and FDI, the results suggest that South migrants that relocate in North play a positive role in attracting FDI from North to South. This positive association is stronger when the stock of skilled migrants is high. Skilled migrants are more educated, they understand how the political and legal systems influence the corporate sector. The knowledge they transmit to foreign investors when they assimilate in the business climate in the North attracts higher FDI to South. However, I do not find any strong evidence that higher start-up costs reduce the positive effect of South-North migration on North-South FDI. Hence, aside remittances, South migrants bring benefit to their countries' of origin through information channels that attract investment from North to South.

3.7 Tables and Figures

Table 3.1: Foreign-Born South Migrants and North-South FDI in 2000

	(1)	(2)	(3)	(4)
Total Migrants	0.098	0.143**		
	(0.064)	(0.070)		
Total Migrants			0.099**	0.177**
(weighted by Population)			(0.045)	(0.074)
Start-up Cost	-0.011**	-0.009*	-0.011**	-0.011**
	(0.005)	(0.005)	(0.005)	(0.005)
Total Migrants*Start-up Cost		-0.000*		
		(0.000)		
Total Migrants*Start-up Cost				0.000
				(0.000)
Market Size	0.462	0.368	0.675	0.763
	(0.518)	(0.519)	(0.502)	(0.523)
Legal Strength	0.817***	0.827***	0.777***	0.842***
	(0.177)	(0.176)	(0.178)	(0.185)
Distance	-1.182***	-1.155***	-1.182***	-1.276***
	(0.246)	(0.246)	(0.246)	(0.256)
Colonial Relation	1.511***	1.597***	1.511***	1.435***
	(0.366)	(0.368)	(0.366)	(0.400)
Linguistic Ties	0.511*	0.440	0.511*	0.331
	(0.279)	(0.282)	(0.279)	(0.307)
Inflation	-0.078*	-0.078*	-0.085**	-0.099**
	(0.040)	(0.040)	(0.040)	(0.045)
Observations	376	376	376	322
R-squared	0.876	0.877	0.876	0.874

Robust standard errors clustered around country pairs are in parentheses. All regressions include North and South fixed effect. Constant terms are not reported. *, ** and *** indicate significance at 10%, 5%, and 1% respectively. Migration and FDI datasets are for the year 2000. Columns (3) and (4) use total migration weighted by population as the dependent variable of interest.

Table 3.2: Foreign-Born Skilled Migrants from South and North-South FDI in 2000

	(1)	(2)	(3)	(4)
Skilled Migrants	0.224***	0.270***		
	(0.072)	(0.075)		
Skilled Migrants			0.215***	0.383***
(weighted by Population)			(0.026)	(0.095)
Start-up Cost	-0.008*	-0.006	-0.006	-0.012**
	(0.005)	(0.005)	(0.005)	(0.005)
Skilled Migrants*Start-up Cost		-0.001**		
		(0.000)		
Skilled Migrants*Start-up Cost				-0.001**
				(0.000)
Market Size	0.307	0.226	0.793	0.774
	(0.511)	(0.509)	(0.491)	(0.488)
Legal System	0.845***	0.854***	0.753***	0.752***
	(0.173)	(0.172)	(0.174)	(0.173)
Distance	-1.158***	-1.145***	-1.158***	-1.145***
	(0.243)	(0.241)	(0.243)	(0.241)
Colonial Relation	1.262***	1.358***	1.262***	1.358***
	(0.373)	(0.374)	(0.373)	(0.374)
Linguistic Ties	0.364	0.333	0.364	0.333
	(0.282)	(0.281)	(0.282)	(0.281)
Inflation	-0.079**	-0.078**	-0.096**	-0.097**
	(0.039)	(0.039)	(0.039)	(0.039)
Observations	357	357	357	357
R-squared	0.883	0.885	0.883	0.885

Robust standard errors clustered around country pairs are in parentheses. All regressions include North and South fixed effect. Constant terms are not reported. *, ** and *** indicate significance at 10%, 5%, and 1% respectively. Skilled Migration and FDI datasets are for the year 2000. Columns (3) and (4) use total migration weighted by population as the dependent variable of interest.

Table 3.3: Foreign-Born South Migrants and North-South FDI in 2005

	(1)	(2)	(3)	(4)
Total Migrants	0.169***	0.210***		
	(0.047)	(0.051)		
Total Migrants			0.169***	0.190***
(weighted by Population)			(0.047)	(0.052)
Start-up Cost	-0.009**	-0.007*	-0.007**	-0.008**
	(0.003)	(0.004)	(0.004)	(0.004)
Total Migrants*Start-up Cost		-0.000**		
		(0.000)		
Total Migrants*Start-up Cost				0.000
				(0.000)
Market Size	1.148***	1.074***	1.515***	1.538***
	(0.336)	(0.337)	(0.324)	(0.341)
Legal Strength	0.482***	0.486***	0.413***	0.394***
	(0.129)	(0.128)	(0.131)	(0.134)
Distance	-1.239***	-1.207***	-1.239***	-1.266***
	(0.164)	(0.164)	(0.164)	(0.170)
Colonial Relations	1.802***	1.853***	1.802***	1.710***
	(0.289)	(0.289)	(0.289)	(0.299)
Linguistic Ties	0.040	-0.014	0.040	-0.018
	(0.209)	(0.210)	(0.209)	(0.218)
Inflation	-0.103***	-0.102***	-0.116***	-0.113***
	(0.026)	(0.026)	(0.026)	(0.028)
Observations	702	702	702	611
R-squared	0.836	0.837	0.836	0.839

Robust standard errors clustered around country pairs are in parentheses. All regressions include North and South fixed effect. Constant terms are not reported. *, ** and *** indicate significance at 10%, 5%, and 1% respectively. Skilled Migration and FDI datasets are for the year 2005. Columns (3) and (4) use total migration weighted by population as the dependent variable of interest.

Table 3.4: Foreign-Born Skilled Migrants from South and North-South FDI in 2005

	(1)	(2)	(3)	(4)
Skilled Migrants	0.273***	0.280***		
	(0.051)	(0.055)		
Skilled Migrants			0.182***	0.281***
(weighted by Population)			(0.026)	(0.054)
Start-up Cost	-0.008**	-0.008**	-0.006	-0.006
	(0.003)	(0.004)	(0.004)	(0.004)
Skilled Migrants * Start-up Cost		-0.000		
		(0.000)		
Skilled Migrants * Start-up Cost				-0.000
				(0.000)
Market Size	0.969***	0.959***	1.563***	1.563***
	(0.332)	(0.334)	(0.320)	(0.320)
Legal Strength	0.478***	0.478***	0.366***	0.364***
	(0.127)	(0.127)	(0.129)	(0.129)
Distance	-1.152***	-1.147***	-1.152***	-1.147***
	(0.160)	(0.161)	(0.160)	(0.161)
Colonial Relations	1.608***	1.614***	1.608***	1.614***
	(0.291)	(0.292)	(0.291)	(0.292)
Linguistic Ties	-0.140	-0.147	-0.140	-0.147
	(0.210)	(0.211)	(0.210)	(0.211)
Inflation	-0.095***	-0.095***	-0.115***	-0.116***
	(0.025)	(0.025)	(0.025)	(0.025)
Observations	671	671	671	671
R-squared	0.842	0.842	0.842	0.842

Robust standard errors clustered around country pairs are in parentheses. All regressions include North and South fixed effect. Constant terms are not reported. *, ** and *** indicate significance at 10%, 5%, and 1% respectively. Skilled Migration dataset is for 2000 and FDI dataset is for 2005. Columns (3) and (4) use total migration weighted by population as the dependent variable of interest.

Table 3.5: List of South Countries

Afghanistan(AFG)	Dominica(DMA)	Lesotho(LSO)	Seychelles(SYC)
Albania(ALB)	Dominican Republic(DOM)	Liberia(LBR)	Sierra Leone(SLE)
Algeria(DZA)	Ecuador(ECU)	Libyan (LBY)	Solomon Islands(SLB)
Angola(AGO)	Egypt(EGY)	Madagascar(MDG)	Somalia (SOM)
Argentina(ARG)	El Salvador(SLV)	Malawi(MWI)	South Africa(ZAF)
Bangladesh(BGD)	Eritrea(ERI)	Malaysia (MYS)	Sri Lanka(LKA)
Belarus(BLR)	Ethiopia(ETH)	Maldives(MDV)	Sudan(SDN)
Belize(BLZ)	Fiji(FJI)	Mali(MLI)	Suriname(SUR)
Benin(BEN)	Gabon(GAB)	Mauritania(MRT)	Swaziland(SWZ)
Bhutan(BTN)	Gambia(GMB)	Mauritius(MUS)	Tanzania(TZA)
Bolivia(BOL)	Georgia(GEO)	Morocco(MAR)	Thailand(THA)
Botswana(BWA)	Ghana(GHA)	Mozambique(MOZ)	Togo (TGO)
Brazil(BRA)	Grenada(GRD)	Namibia(NAM)	Tunisia(TUN)
Bulgaria(BGR)	Guatemala (GTM)	Nepal(NPL)	Uganda(UGA)
Burkina Faso(BFA)	Guinea(GIN)	Nicaragua(NIC)	Ukraine(UKR)
Burundi(BDI)	Guinea-Bissau(GNB)	Niger(NER)	Uruguay(URY)
Cambodia(KHM)	Guyana(GUY)	Nigeria(NGA)	Venezuela(VEN)
Cameroon(CMR)	Haiti(HTI)	Pakistan(PAK)	Viet Nam(VNM)
Cape Verde(CPV)	Honduras(HND)	Palau(PLW)	Yemen(YEM)
Central African Rep.(CAF)	India(IND)	Panama(PAN)	Zambia(ZMB)
Chad (TCD)	Indonesia(IDN)	Papua New Guine(PNG)	Zimbabwe(ZWE)
Chile (CHL)	Iran(IRN)	Paraguay(PRY)	
China(CHN)	Iraq(IRQ)	Peru(PER)	
Colombia(COL)	Jamaica(JAM)	Philippines(PHL)	
Congo(ZAR)	Jordan(JOR)	Romania(ROM)	
Congo, the Dem. Rep. (COG)	Kenya(KEN)	Rwanda(RWA)	
Costa Rica (CRI)	Kiribati (KIR)	Samoa(WSM)	
Cuba (CUB)	North Korea(PRK)	Sao Tome and Principe(STP)	
Djibouti(DJI)	Lebanon(LBN)	Senegal(SEN)	

Table 3.6: List of North Countries

Norway(NOR)
Denmark(DNK)
Luxembourg(LUX)
Austria(AUT)
Netherlands(NLD)
Finland(FIN)
Canada(CAN)
Slovak Republic(SVK)
France(FRA)
Czech Republic(CZE)
Sweden(SWE)
United Kingdom(GBR)
Australia(AUS)
Italy(ITA)
United States(USA)
Iceland(ISL)
Portugal(PRT)
Germany(DEU)
Japan(JPN)
Switzerland(CHE)
Korea(KOR)

Table 3.7: Summary Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Legal Strength (2005)	1839.00	4.54	2.36	0.00	10.00
log(Distance)	1926.00	8.82	0.56	6.43	9.86
log(Total Migrants)	1165.00	6.66	2.73	0.00	14.12
log(Skilled Migrants)	1117.00	5.44	2.73	0.00	13.40
log(GDP per Capita)	1859.00	6.85	1.12	4.46	8.95
Linguistic Ties	1926.00	0.13	0.34	0.00	1.00
Colonial Relations	1926.00	0.00	0.00	0.00	0.00
Log (FDI) (2000)	787.00	2.55	2.79	-2.06	10.51
Log(FDI) (2005)	1451.00	1.97	2.67	-2.17	10.34
Start-up Costs	1839.00	111.13	175.44	4.70	1190.00

Figure 3.1: Line Plot of Migration Flows: 1960-2000

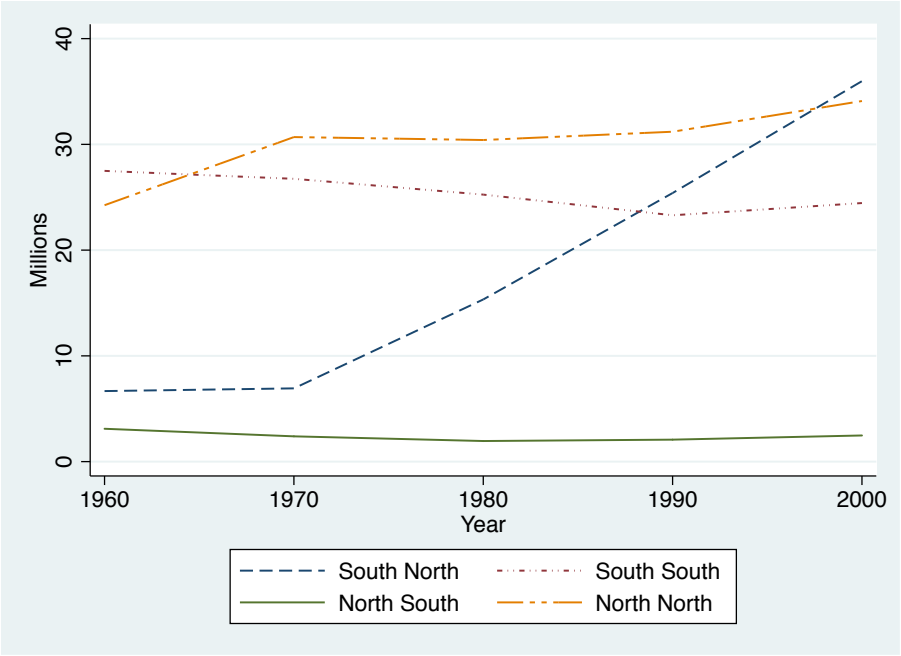
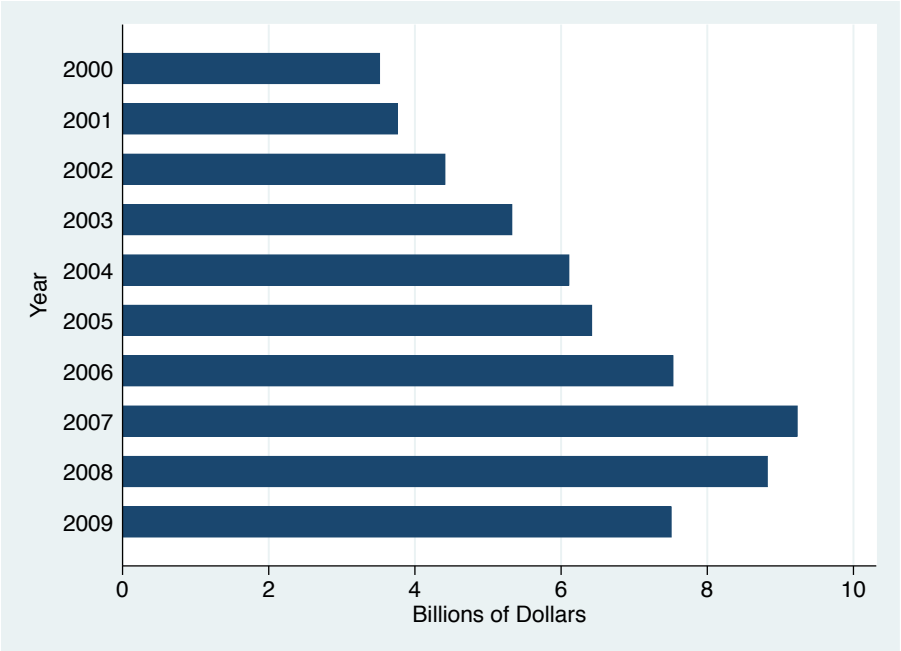


Figure 3.2: FDI from North to South:2000-2009



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